CANADIAN ARCHITECT AND BUILDER.

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CANADIAN ARCHITECT AND BUILDER,

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ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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The Toronto Architectural Club.

It is to be hoped that the Architectural Club of Toronto is to be a permanent institution. There is certainly room for one. Time and again, architectural clubs have been formed, but after a season or two have disappeared. The present club has put its existence on record through North America by its action in sending Mr. J. P. Hynes as delegate to the gathering of clubs at Cleveland, Ohio, an account of which appeared in our last issue from the pen of the delegate. The club can do no end of good to the profession, and we would like to see more architects on its membership roll.

A New Climber Wanted.

There has been great destruction this year of many plants that have hitherto seemed able to stand the climate of Ontario. Many garden perennials failed to come up in the spring and will no doubt be noted by gardeners. A failure more interesting to architects is that of the Boston ivy and privet. Strong privet hedges many years old are dead on top and have had to be cut down from six feet high to about two feet. Young plants of Boston ivy, put in round new houses at the close of the summer are all dead, but worse than that is the destruction to old and well grown plants. The standard example in Toronto was Mr. George Gooderham's house which was covered up to the cornice with a thick growth of Boston ivy. This is now cut down to the ground. The work of ten years has to be begun again. The fact that plants on the north side of a building are safe, shows that the destructive agency was not the cold alone, but the cold in connection with a comparatively strong sun; and the cause of damage was really the absence of a bed of snow on the ground, to lie about the roots and stem, and protect them from the warmth of the sun at a time when it was death to the plant if the sap moved. There is nothing to equal the

Boston ivy as an architectural climber. It understands its work thoroughly and, like all subordinates who do, it respects the architect's design. It is the best plant for architects, but since it needs extensive protection the field is open for further discovery in climbers. As to the hedge, the barberry is as good as privet, and examples in Toronto came through the winter unhurt.

The Pan-American Exhibition.

The time has arrived when the great Pan-American Exhibition to be held in Buffalo next year begins to assume practical proportions. The committee of architects who have been directed to design the various buildings has met in Buffalo and inspected the site and after electing Mr. Carriere of New York as its chairman and apportioning the work among its members, it has dispersed to work out the necessary designs. The eminent President of the Exhibition Company, Mr. Bissett, has great hopes that the Province of Ontario will be well represented and to this end he gathered together a large assemblage of Ontario's business men, the members of the provincial government, bankers and others, entertaining them at his own residence and going fully into the details of the exhibition. It is certain that this province can make a fine exhibition and it is to be hoped the opportunity will be greatly patronized.

The British Fire Prevention Committee.

The British Fire Prevention Committee has already issued nineteen publications. In another column is some account of the matter of one these pamphlets. There is no doubt that the Committee is accumulating valuable information, and it is published in a convenient form. The list of publications, up to No. 19, are as follows:

1. What is Fire Protection?
2. American opinions on Fire Prevention.
3. The Paris Bazaar Fire.
4. Theatre Exits.
5. The New York Fire Department.
6. Cotton Fires and Cotton Bales.
7. "Fire Resisting" Floors used in London.
8. Fire Service in Factories, Works etc.
9. Lessons from Fire and Panic.
10. How to Build "Fire Proof."
11. Tests with Unprotected Columns.
12. The Effect of Fire.
13. The Testing Station of the B. F. P. C.
14. Official Fire Tests with Floors (No. 1.)
15. Conflagrations during the Last Ten Years.
16. Experimental Fire Tests with Floors (A.)
17. The Tall Building under Test of Fire.
18. Experimental Fire Tests with Floors (B.)
19. Official Fire Tests with Ceilings (No. 1.)

The prices are not stated on the list, but seem to be from one to three shillings a number. There is nothing in the price to prevent their wide circulation, and certainly public libraries and the libraries of the Architectural Associations ought to arrange to receive all publications as they come out.

The Toronto School Art League.

A movement which had its origin in the United States, is on foot to make school buildings themselves tell as a means of education. At present their effect is either negative or positively injurious to the powers of perception which make up what we call "taste." Some time ago at the opening of the Rosedale School, Toronto, Mr. Hughes, the Superintendent of Public Schools, made some observations on the influence of art education, and referred to the spread of the movement to make school rooms more beautiful. Taking suggestion from this, the ladies of the district immediately organized a league which was named the Ladies League of School Art. Realizing the danger of mere activity without experienced direction, the Rosedale League asked for the co-operation of the Ontario Society of Artists and finally put themselves and their movement into the hands of the Ontario Society. This body devised the establishment of a central Advisory Board for School Art Leagues, and called into consultation the Toronto Guild of Civic Art and certain officials. The Advisory Board has been appointed according to a memorandum prepared by the Ontario Society of Artists. It consists of four ex-officio members viz., the Minister of Education, the Mayor, the Chairman of the School Board and the Superintendent of Public Schools; and of twelve appointed members, to consist of four artists, four architects and four laymen; two of each class to be appointed by the Ontario Society of Artists and the other two by the Toronto Guild of Civic Art. The Advisory Board is now publishing a pamphlet which states the objects of the league and gives information to help forward their attainment. The objects are briefly defined as "good surroundings" for the children. Good surroundings are further defined as, 1st, proper hygienic conditions; 2nd, a good style of architecture; 3rd, good colouring; 4th, mural decorations or framed pictures such as will illustrate the subject matter of school books and train the childrens' eyes to the appreciation of standard works of art. Experiments made at Boston have shown that, in the matter of wall coloring, art and hygiene are at one; the most pleasing tints are also the most restful to the eye. The usefulness of the general hygienic conditions proposed under the first class of good surroundings is also capable of scientific proof. That there is gain in surrounding the children with good architecture and keeping beautiful and noble objects before their eyes is equally capable of demonstration if we put together the numberless little instances in our own experience, and the numberless illustrations that may be extracted from biography and literature of the influence which the character of architecture and the ideas conveyed by works of art have had upon young minds. Affection for home, for school, for church and country may be indellibly stamped in this way upon the mind in youth; making a good foundation for domestic virtues, love of learning, instinctive religion and sound patriotism. That the art which aims merely at sensuous impressions is equally useful is to be doubted. There is such a thing as the mere cultivation of taste which is not a source of strength but of weakness. But that good taste should be used to commend good ideas is a proper aim, and is indeed the true end of art. An excellent appendix to the pamphlet is a list of photographs and casts suitable for this purpose. The size and cost and the dealers from whom they may be procured are given. Photographs of paintings and architecture are classified according to national origin. It is a useful catalogue.

The Rat Portage Brick Company, Limited, has recently been incorporated at Rat Portage, Ont., with a capital of $25,000. The Company will manufacture this season between 3,000,000 and 4,000,000 brick. They also manufacture a good quality of fire brick.

A STUDY OF CONFLAGRATIONS.

The British Fire Prevention Committee have recently published, as No. 15 of their publications, a paper by Mr. Charles E. Goad, whose maps are so well known in insurance offices, read at a meeting of the Insurance Institute, of Manchester. The paper, which is entitled, "Conflagrations During the Last Ten Years," gives an account of the more important fires in English speaking countries during the last ten years, with plans to show the site of the fire and the progress of the flames. The burning of the University of Toronto in 1890, and the three great Toronto fires, which occurred so close together in 1895, receive due notice. The paper was not written for architects, and deals chiefly with the accidents or carelessness and the untoward natural circumstances which were the moving causes in the disasters. But architects may read it with profit, for as it is buildings that are destroyed, there is always a question of building involved somewhere in the story. There is implied in some of the narratives a clear case against wooden buildings, even when detached. We cannot but regret the impossibility of accepting the wooden house which presents such an enviable appearance in American towns; they cost less than brick, have more possibilities of elegance, and, as built now-a-days, are really warmer than brick. But when a fire gets started on any great scale, which is usually when there happens to be a strong wind blowing, the size of the burning fragments that are driven upwards from the blaze, and the distances they will travel, are such that, where wooden houses are common, there is every chance of the fire being enabled to start work in so many places as to divide up the firemen until they have an effective force nowhere. This is what happened when Windsor, Nova Scotia, was burnt in 1897; embers were carried from the place where the fire started to a point 900 yards away "setting fire to isolated buildings all over the town;" and the firemen, finding that the fire was unmanageable, left it and went to look after their own families. The wooden wharf building, which we accept as a necessity, was the origin of the fire that destroyed New Westminster, B.C., and might easily produce trouble in a place like Toronto, where there is a jumble of wooden warehouses along the water front. A southerly wind, upon which in Toronto would depend the communication of fire from the water front to the city, was sufficient for the work in New Westminster. The origin of the conflagration in this place was a startling illustration of how unclassified chances intrude at fires. Three steamers and a coal barge were lying along the wharves at short distances from one another. The time was midnight, or, as Mr. Goad says, 23.30 o'clock. The steamer furthest up stream was moored to the wharf where was the wooden warehouse full of hay, in which the fire started. She soon caught fire, and her moorings being burnt also, started down stream. She immediately collided with the next steamer and set her on fire. These two then drifted down together, picking up as they went the third steamer, and the coal barge. The four blazing vessels all went down stream, keeping close to the wharves, and, with the precision of a plan of attack, set alight one after another the wooden sheds, wharves and canneries for a distance of 500 yards before they swung out into the stream. The flames thus started simultaneously along the ends of seven streets, rushed up the hill with the wind behind, spreading as they went, until arrested by vacant ground at the sides and a 150 foot avenue at the end. It seems apparent that towns on a slope give a slight additional opportunity to a conflagration. That the flames can manage to make their way without this assistance is evident in the history of Chicago, which excels both in its flatness and its conflagration. Great fires in this country seem to have been much influenced by the question of water. Where there were no engines the pressure was reduced below efficiency by opening too many hydrants at once; or hydrants have been found to be frozen; or, worst case of all, at St. John's, Newfoundland, the water pipes were being cleaned, and (with forest fires inland) were empty, and, as the official report says, "it would take at least three hours running of the water from the mains for the pressure to have been sufficient in the quarter where the fire started."

These facts, though interesting, are not exactly within the province of the architect. When we pass over to England, one or two types of contributory causes in the case of the great conflagrations are such as we may note for the purpose of avoiding them. The narrow streets were, of course, easily leaped over by the flames, but worse than this was the facility offered to the fire and the hindrance caused to the firemen by the solid building of the inner part of the blocks. It is one of the interests of London, to a Canadian, to see how these interior spaces are used up. London, in the business part is, at least, one storey high from street to street. There have to be light areas at certain distances from the outsides of the block, but they go no further down than is necessary, and at the bottom the ground floor continues through under a skylight. The want of outside entrance to these courts, the smallness of their area, and the way in which the bottom was enclosed with glass seems to have embarrassed the firemen so, that, as Mr. Goad says, "when fire reached one of these light courts it had free play to attack from 5 to 20 buildings in the rear without any hindrance whatever." It is not apparent why the 5 to 20 buildings should not each afford a footing for men with a hose to fight back the fire's advance. (As there were 51 steam fire engines at the fire and 294 men, there could have been no lack of hose.) It would take longer to get to a position on the roofs behind than to run the hose in along the ground up a back alley; but the London captain, who is accustomed to solid building, should, one would think, lose no time in pining for a back alley, but proceed at once to the next street and advance over roofs to take the fire in the rear. However, if the fire can be reached in this way, it is not so easily reached as from the ground, and we may well hesitate about fitting up, without due regard for either fireproofing or a firemens' approach, the extensive spaces which are now so wastefully left in the centre of business blocks in this country.

There is a precaution against the spread of fire inwards which we may extract from a comment made on several occasions in this paper—that the wind was blowing in the direction in which the fire walls ran. In the Cripplegate fire there was a remarkable radiation of fire walls from the block in which the fire began. Elsewhere Mr. Goad speaks of the extension of the fire over "a good wall" as "a noticeable feature" of a fire, and accounts for it by the shape of the roof and the presence of skylights. In other words, the fire wall is always spoken of with respect. This confidence in the fire wall suggests a more complete system of such walls. Why should there not be, in the business quarter, fire walls

all round every building, so that all winds would be crossed by a wall? In Toronto, at any rate, the practice of draining the roof to a central point and bringing down the rain water conductor inside the building, where it can keep warm, seems to be growing in favor. There is, therefore, no need for the slope to the rear and the open end to the roof in that quarter so favorable for the communication of fire. We may box in each building with a fire wall and have, if necessary, the most severe parapet to the rear. It is assumed that roofs in business quarters will be flat, as indeed they ought to be.

Little is said about iron in this paper, but what is said is startling. In the fire at Charterhouse Square, London, "a large front wall was pushed out by the expansion of iron girders, and in its fall damaged the premises on the opposite side of a very wide street." The burning of the first non-fireproof Simpson building in Toronto is described:—"Eleven minutes after the first alarm, flames burst through the roof, which, fourteen minutes later, caved in and part of the wall fell out. Twenty minutes later the remainder of the Yonge and Queen street elevations fell out into the street." He does not, however, point out that this rapid work was due to the failure and torsion of unprotected iron. After the fire the cellar was full of twisted iron, and fifteen inch beams that had fallen across walls hung like towels on a rail. Unprotected iron is not so much a weak friend as a powerful enemy.

SANITARY REGULATIONS FOR BUILDERS IN PARIS.

In view of the large number of old buildings requiring to be removed and the extensive excavations necessary in connection with the preparations for the Paris Exposition, new sanitary regulations have recently been imposed on the contractors engaged in this work. Past experience having demonstrated that the disturbance of old foundations and old buildings frequently leads to epidemics of fever and other contagious diseases in the locality by the releasing of the disease germs into the atmosphere, the new regulations referred to require that before entering upon the erection of buildings on the sites of old structures, the premises shall be thoroughly disinfected---dusting all these many centers of disease with a preparation composed of one pound of pulverized sulphate of iron, and two and a half pounds of quicklime; while all debris emanating from the demolition, and other excavated material, must be transported to the specially indicated discharging stations or points situated outside of Paris. By way of further precaution, builders are also obliged to erect boarding of a certain height, so as to prevent the dust arising from the excavation from penetrating into neighboring premises. The law also prescribes certain conditions which are to be kept in view at all times as regards the actual demolition process; in fact, all contractors must bind themselves to observe them faithfully before being even permitted to commence operations.

All cesspools, whether of a fixed or movable nature, all wells, all cellars employed as stores for cheese and organic matters, private sewers, subterranean piping, walls, etc., are henceforth to be sprinkled over with a solution of 3 per cent. of sulphate of iron, then properly whitewashed with a solution of quicklime. The greatest care is also to be taken to make sure that the lime wash employed is made with genuine quicklime, and not adulterated with carbonate of lime or whitening. Alum though may be added, the better to enable the lime to unite with the water. In any case, this lime wash of late is becoming less adopted. It was accepted as an efficacious substance against epidemics and infectious disease. Its action upon microbes has been fully recognised; besides, this wash possesses the advantage of absorbing both dust and germs rapidly, while being easily converted into carbonate of lime. However, the authorities maintain that any wash prepared from whitening is to be strictly avoided, due to it containing a gelatine, which is considered more or less putrified, and so constitutes a fertile breeding ground for bacilli.

MR. REID'S MURAL PAINTINGS.

In addition to the views of a correspondent on this subject, printed in our June number, we have received from another source the following: "It is indeed to be hoped that the Toronto Guild of Civic Art is not going to develop into the condition of a "mechanical poor box" that says "thank you" for all it receives, whether it be a trouser button or a quarter. The Guild will belie its personal taste and prostitute its objects if its members have not the courage of their convictions to speak out and give their opinions openly as to the merits and value of art donations to the city. There was published in the Canadian ARCHITECT AND BUILDER, last month, a criticism from a correspondent on Mr. Reid's gift to the City Hall, and while bearing in mind the fact, that even the best examples of art are subject to adverse criticism, it certainly is a serious question, if your correspondent's remarks are correct.

The city may gladly receive the generous offerings of public-spirited men, but the Guild of Civic Art should be able to advise truly as to the intrinsic value, so that poor works may not be given too conspicuous a position or permitted to occupy space that should be reserved for better."

THE STRIKE EVIL.

The unusually large number of strikes, not only in the building trades but in many other liner seems to have been characteristic of this season. Strikes are serious enough of themselves and do an incalculable lot of harm morally as well as financially, but when riots is added as an element of violence we seem to be getting back to the dark ages. Rioting and lawlessness are certainly on the increase among strikers and thereby the general public are made to suffer through the disputes between employers and their men, and to suffer bodily injury as well as mere annoyance or inconvenience. Our police regulations need amendment to meet the new condition of things and the machinery of Dominion legislation should be put in motion to crush out the evil.

CORRESPONDENCE.

HAMILTON ART SCHOOL.

HAMILTON, July 14th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

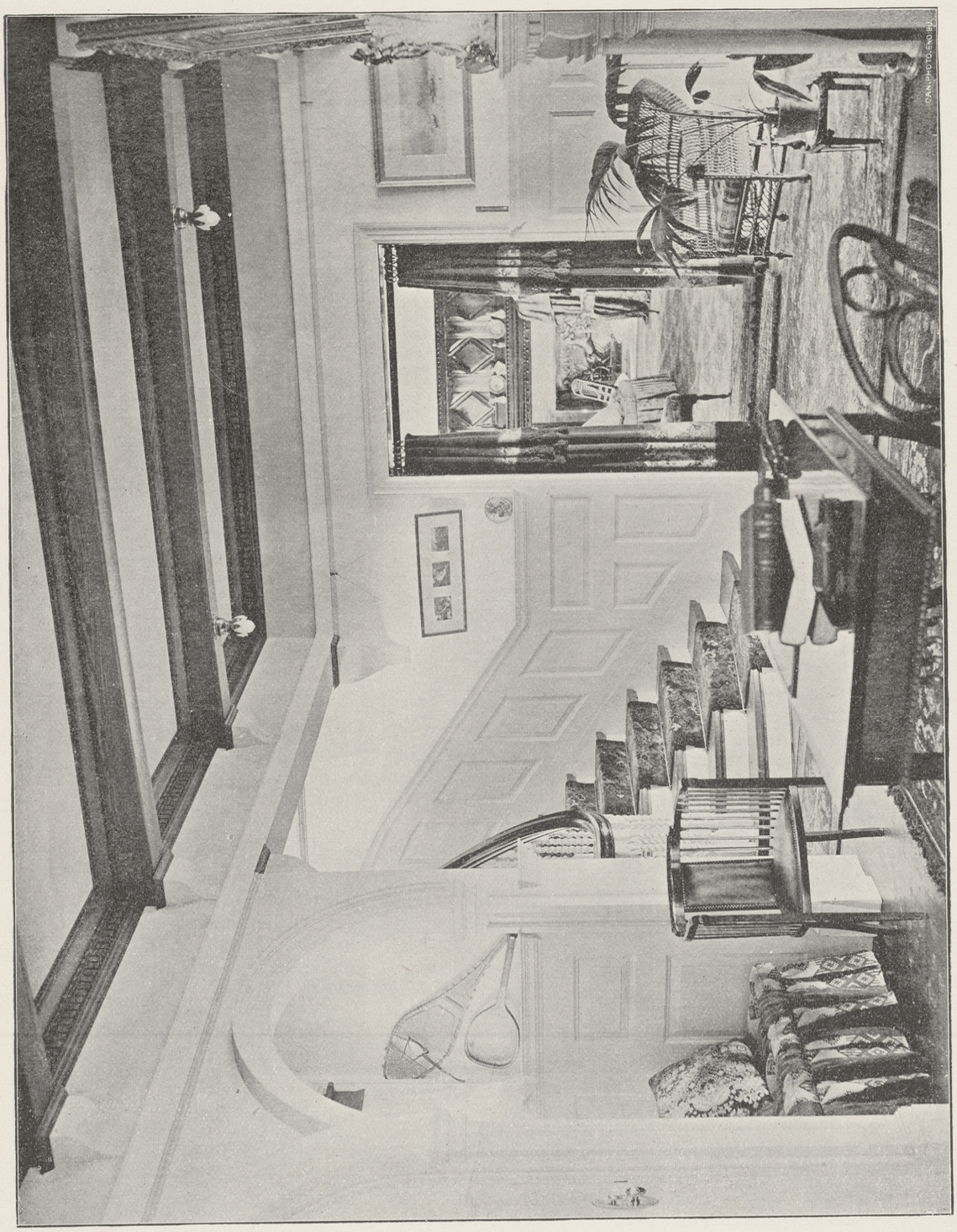
SIR,—As you have opened your columns to discuss the working of Art Schools in Ontario, the directors of this school wish to state that they consider it has met the requirements of all classes of citizens. They feel, however, that students do not study in the school sufficiently long to derive the best results, and they attribute the cause partly to the method of granting certificates, and suggest that certificates of 3rd, 2nd and 1st class be granted instead of the one standard as at present, and that the difficulty of a 1st class examination would require at least 3 years' study by an average student before being able to pass it.

Yours truly,

HUGH MURRAY, President.

W. MARSHALL, Hon. Sec.-Treasurer.

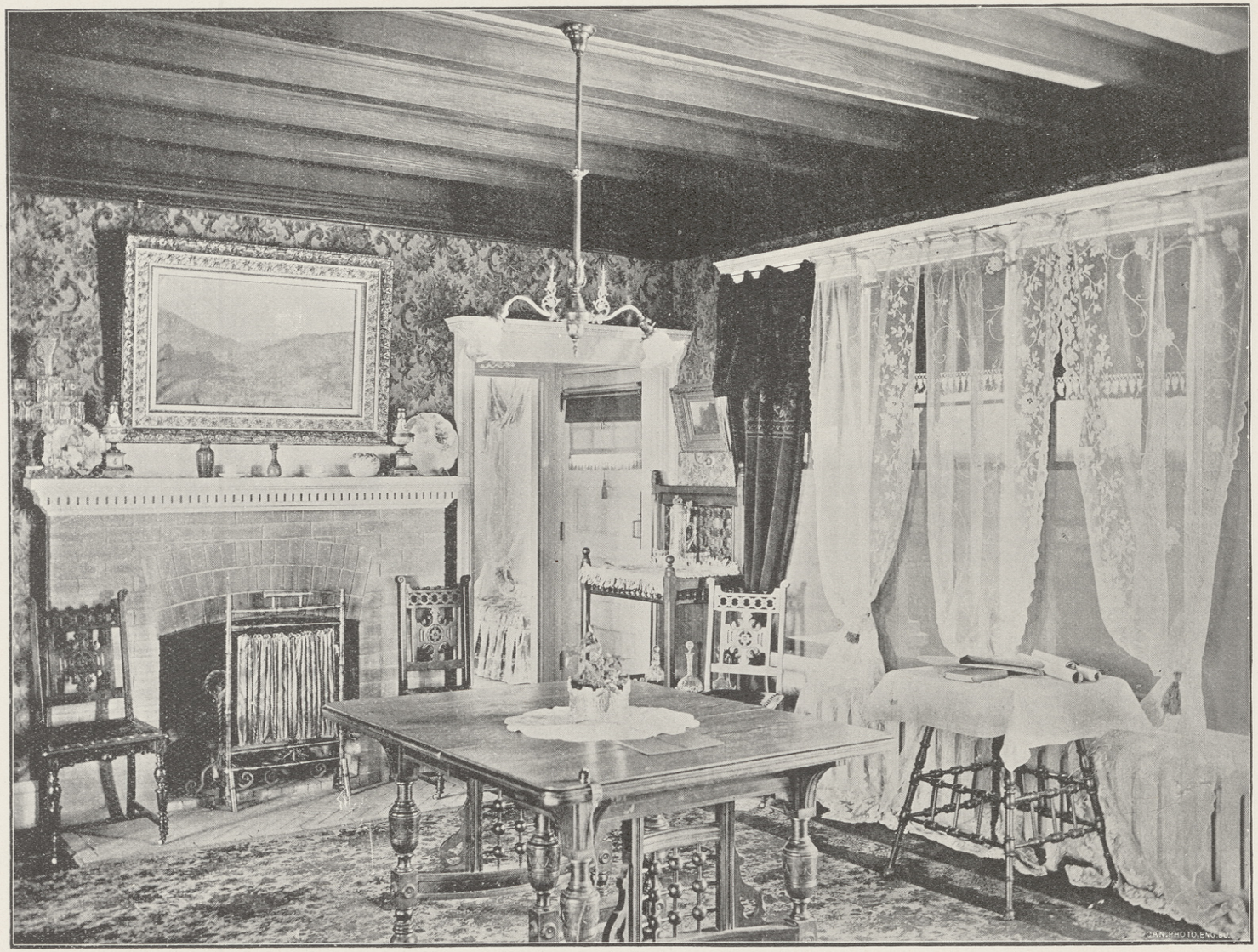
DETAIL OF ENTRANCE—RESIDENCE OF MR. F. B. FETHERSTONHAUGH, MIMICO.
HENRY SPROATT, ARCHITECT.



HALL—RESIDENCE OF MR. F. B. FETHERSTONHAUGH, MIMICO.
HENRY SPROATT, ARCHITECT.

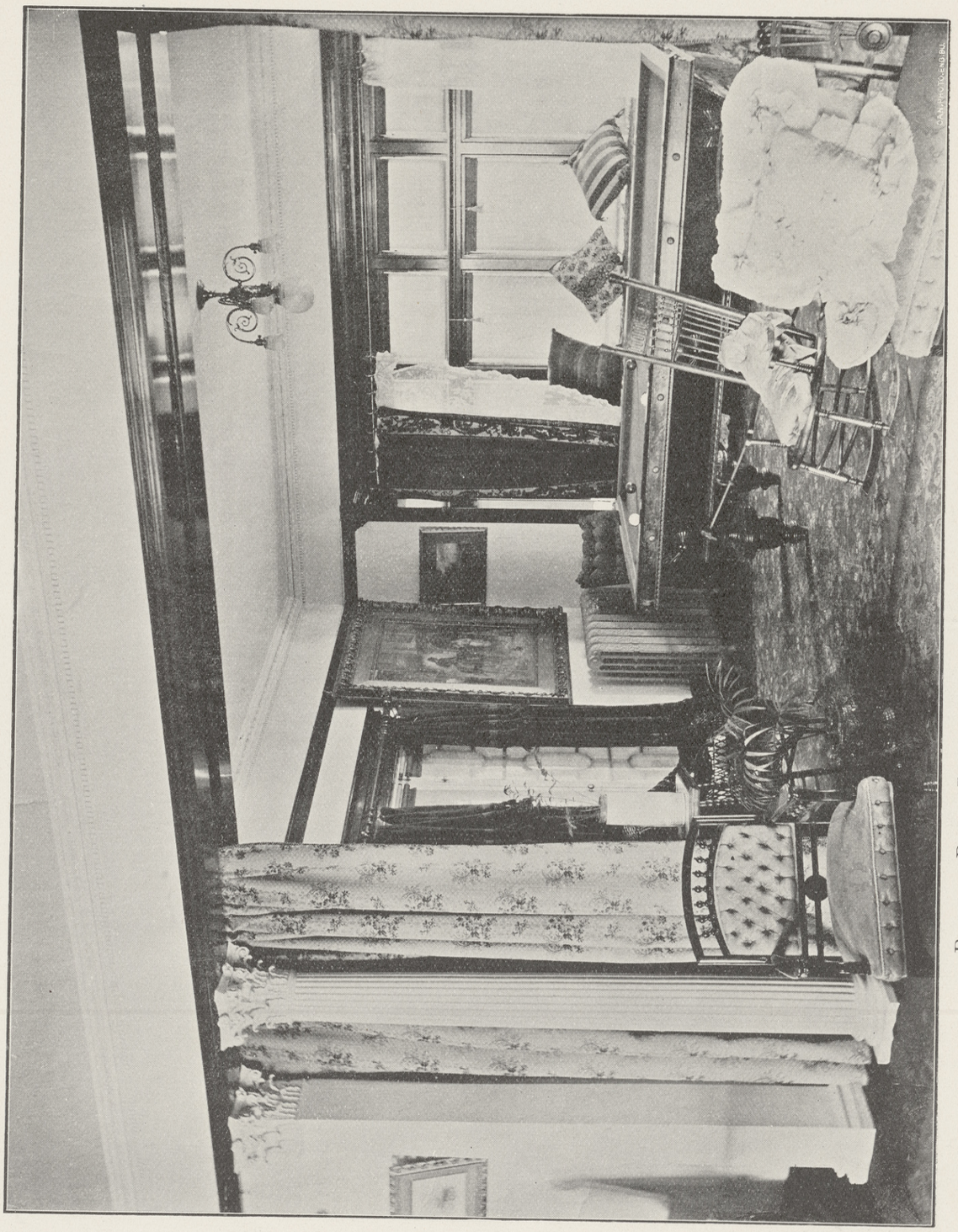
Hall—Residence of Mr. F. B. Fetherstonhaugh, Mimico.

Henry Sproatt, Architect.



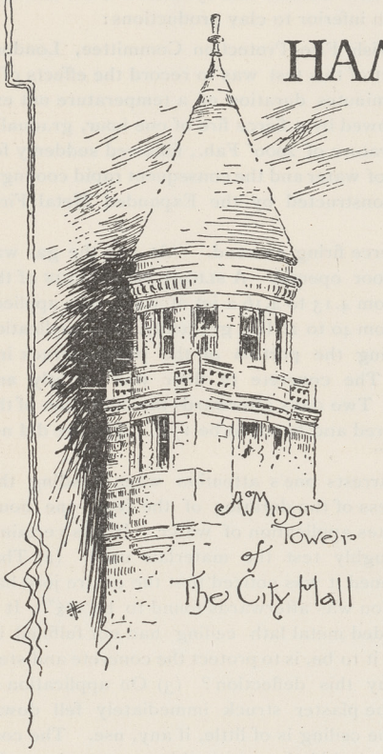
DINING ROOM—RESIDENCE OF MR. F. B. FETHERSTONHAUGH, MIMICO.

HENRY SPROATT, ARCHITECT.



BILLIARD ROOM—RESIDENCE OF MR. F. B. FETHERSTONHAUGH, MIMICO.
HENRY SPROATT, ARCHITECT.

HAMILTON



(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The Hamilton City Improvement Society is one which might very well have its counterpart in every city of the Dominion. Its objects are, in the first place, practical rather than artistic. Its aim is to beautify the city by cleanliness and attention to sanitation before it undertakes ideas towards embellishment. It is composed of every citizen who likes to join and pay one dollar towards expenses. The management of the Society is in the hands of a large executive committee, composed of many residents of influence and property, and some of the ministers of various denominations. It is not intended in any way that the organization should be antagonistic to the City Council, but entirely the reverse. It wishes to assist the council by its moral support in the carrying out of all schemes that shall be for the welfare of the city within practical limits. The Society is very young yet, having only held one meeting of the executive, but upon that occasion it was decided to send to the city council a memorandum suggesting various improvements and requesting that instruction be given to the various officials to have the matters attended to. Such matters, for instance, as the flushing of the sewers—a most necessary precaution in a long dry season such as we are having—the failure to attend to this being a fruitful cause of epidemic. No doubt the proper department of the corporation should see that this is done without having to be reminded by the citizens, but since it is overlooked, it is well to have somebody to give a gentle prod. The cleaning up of the streets in the centre of the city, after "closing time" on Saturday night is also a matter being looked after by the H.C.I.S. It has been the custom for merchants to sweep out their stores into the streets, and on Sunday morning the litter of paper and rubbish at the principal corners has a disgraceful appearance. Perhaps one of the most important functions of the society will be to keep alive the suggested improvement schemes after the decease of the council in which they are first contemplated. Many a good scheme has been propounded, and everything got ready for its execution, and then a new council board being elected the scheme is forgotten and nothing is heard of it again for perhaps many years. In this way it is hoped that all properly digested plans for the embellishment of the city may be carried out within a reasonable time after their conception. It has taken the city something like fifteen years to get the extension of Gore Park carried out, but this has been accomplished this year. According to an old resident it is nearly fifty years since the idea of making the "mountain" slope into a park was first projected and it still remains to be accomplished. It is probable that the society before long will divide up its executive into committees to deal with different branches of improvements, but at present it is all under one head. Mr. R. T. Steele is president and Mr. Dexter, secretary.

It is certainly hard on the students of the art school that they should be made to suffer by the stand that has apparently been taken by the manufacturers and their "boycott" of that institution, for that is practically what it amounts to. I know of more than one case where a student having an especial talent for stained glass work or designing metal work, has devoted as long as two years to the cultivation of his talent because it was pointed out to him that there was a field for him here and that he could make his living in supplying designs for manufacturers. But when his time expired and he has offered his services or attempted to sell his designs, offering them even at a ridiculously low price, not one manufacturer would buy even for the purpose of giving encouragement. There can be no question as to the necessity of a thorough investigation as to the cause, for in the meantime the usefulness of the school is impaired and its influence wasted. Not only that, but the government grant becomes unnecessary, for the school develops into a mere drawing school—the result of its teaching is not the provision of a livelihood for the students in the city. They must pack up and go elsewhere if they would put their talents to good uses.

A convention of Canadian Electrical Engineers has been held here and appears to have been in every way a success. About 150 members from all parts of the Dominion convened at the New Royal Hotel, holding their meetings and making excursions on the different electric railways that converge here.

R. W. GAMBIER-BOUSFIELD.

LEGAL.

The position of sub-contractors' men in relation to contractors is a subject which might well engage the attention of builders' associations. There is no doubt, says the the Builders' Reporter, that the men who are directly employed by the contractor very often impede the men who are indirectly employed. But a case which was heard before Mr. Adshead Elliott as arbitrator in Manchester on the 6th inst. suggests that it would be well to have definite notions about the position of sub-contractors' men in other ways. The applicant was a bricksetter's labourer, and was engaged on some works for which Messrs. Robert Neill & Sons, who are leading builders in Lancashire, were the contractors. The man assisted Messrs. Neill's men in removing columns, and in the course of the work he was injured. The question was, by whom was he employed? The foreman for Messrs. Neill admitted that on the day in question he asked the sub-contractor to lend him some men, but when the accident occurred the labourer was not employed by his authority. Messrs. Neill defended the action on the ground that if they were compelled to pay compensation to sub-contractors' men who meddled with their work after working hours, the liability would be enorous. The arbitrator said that the only man who could possibly bring the applicant into the employment of the firm was the foreman. But he denied that he had obtained the aid of the man after 4 o'clock, and the accident occurred after 5.30. The application was therefore dismissed. In one sense the result is unsatisfactory, for, with a firm whose works are so well organized as those of Messrs. Neill, how could a man be allowed to "meddle" with any of the operations without the knowledge ot some official? The removal and setting up of columns cannot be considered a pastime. The men engaged in it are exposed to contingencies, and on that account men alone who have a definite position should be employed. A conciliation board would do well to take up the subject and consider it in all its varieties.

PERSONAL.

The sympathy of many friends is being extended to Mr. A. B. Gordon, architect, Toronto, who was recently bereaved of his wife.

Messrs. F. W. Fuller and D. Ewart, architects of the Department of Public Works, Ottawa, are at present in the Klondyke region for the purpose of supervising the erection of public buildings.

Mr. John S. Hooper, of the firm of S. Hooper & Son, architects, Winnipeg, Man., was united in marriage on June 5th, to Miss M. A. Bell, of Dominion City. Mr. Hooper and his bride were the recipients of congratulatory messages and tangible tokens of esteem from many friends in Ontario as well as Manitoba.

An effort is being made to organize a company to manufacture cement at Durham, Ont. The sum of $14,000 of stock is said to have been already subscribed, with the prospect of the amount being doubled in a very short time.

Chimney Design and Theory—a book for engineers and architects—by Wallace Christie, consulting engineer, &c. New York: The D. Van Nostrand Co.; price, $3.00. The author refers to the lack of printed data on the subject of chimney design and construction as the impelling motive in the preparation of the present work on the subject. The large number of defective chimneys which are met with in every locality is also evidence of the need for a more widespread and thorough knowledge of the subject on the part of architects and builders.

FIREPOOFING MATERIALS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR: Mr. Gagnon's letter published in your issue of June is a decidedly strong arraignment of concrete systems of fireproofing and the methods used by these companies to introduce their systems after being practically prohibited in the city of New York; and all who study this question, or have even a secondary interest in it, should feel under an obligation to him for having the courage to publish the information at his command, and for opening up a question of intense interest to the architectural profession.

These companies placed under the law, after a fair trial by the Building Commissioners of New York, rehabilitated by means which were decidedly shady and questionable, are now attempting to persuade Canadian architects that their systems are superior to all others. Their agents, by specious arguments, endeavor to catch the uninformed and unwary, dwelling upon the lightness of construction, saving of weight, and the great tensile strength of concrete, but avoid as much as possible the important question of its ability to resist the action of fire and water—THE CRUCIAL POINT of any system which aspires to be fireproof.

Of what avail the lightness of construction, saving in cost, etc., if the material advocated cannot stand the test of fire and water? Unless it can fulfill THIS condition it becomes useless for the purpose for which it was designed.

One agent, when pressed upon this point, will show photographs of the Pittsburg fire, the Methodist Book Company's building (concrete with suspended wire and iron pipe) and the Horne store (hard tile construction), with the remark "Look and judge for yourself; photos never lie." He carefully suppresses all reports published, and omits to produce a photo of the Phipps building (porous terra cotta). Evidently the latter will not suit his purposes, hence the omission.

2nd. The report of a fire test made by the British Fire Protection Society, London, Eng., which I purpose comparing with the Denver tests before I finish this letter; and finally a test made by the Pittsburg Testing Laboratory, Ltd., which as a test is the most ridiculous I have ever read:

"A slab of concrete, in the lower part of which expanded metal was embedded, 24″ x 24″ x 3″ thick, was supported on iron pegs driven into the ground, leaving 15″ clear underneath. A fire was built underneath of small pine wood and greasy waste. The fire started clear and sharp at 10.57, and kept burning 40 minutes. Dry wood was then applied on top, so the slab was completely surrounded by a sharp fire. It was quenched by a solid stream from ⅝″ nozzle, which continued for 10 minutes. The underside of the slab was damaged but slightly. After three days we discovered recrystallization that would seem to indicate that the composition was getting back to its original set."

To ask any intelligent man to accept such a test is but little short of insulting. A small slab is placed in the open, so much fire as a space 24″ x 24″ x 15″ will admit is kindled and fed for 40 minutes, and we are asked to believe that intense heat was generated and that the slab successfully withstood it, as well as an application of water after. What amount of heat was generated and what portion was concentrated on the slab? It is self-evident that all tests other than official must be looked upon with great suspicion.

As I understand the question of fireproofing, the idea is to keep the steel or iron from being heated, no matter how great the fire, and this seems to me the principle sought for by the majority of inventors for the past eighty years. While the strength of steel is not reduced by a moderate heating, if it be heated beyond 600° Fah., the factor of safety is rapidly reduced, and it BECOMES DANGEROUS, UNLESS PROTECTED BY A MATERIAL WHICH IS CAPABLE OF RESISTING THE EFFECTS OF HEAT. Will concrete or clay best serve the purpose sought? That is a question (until something superior to either is found) which each and every architect must study and solve for himself. A heavy responsibility rests on his shoulders, and it is for him to ascertain if the advice he gives his client is sound or not. I will go one step farther and state, that the architect who has failed to thoroughly grasp all the details of this subject, yet advises his client to use some system of which he has no knowledge (other than that obtained by an agent), not only fails in his duty to his client, but is morally, if not legally, responsible should failure or disaster occur.

Will concrete or clay serve the purpose sought? If we accept Professor Dobie's and Mr. John Webster's, M. Inst. C. E., England, tests, concrete WILL NOT stand the action of FIRE AND WATER. The Pittsburg fire and other serious conflagrations have proved that the conclusions drawn by them were correct; and the following tests, which it must be admitted are unbiased, and which I quote for the sake of comparison, will, I think, convince the most skeptical that concrete and metallic lath systems are not satisfactory, and are very much inferior to clay productions:

(1) Test by the British Fire Protection Committee, London, England. "The object of this test was to record the effects of a smouldering fire of 15 minutes duration of a temperature not exceeding 600° Fah., followed by a fierce fire of one hour, gradually increasing to a temperature of 2000° Fah., followed suddenly for 3 minutes by a stream of water and the consequent rapid cooling." The arch tested was constructed by the Expanded Metal Fireproofing Co.

After one hour's fierce firing we read. "At 4.10 the gas was shut down and the door opened. A SLIGHT DEFLECTION of the soffit was noticed. From 4.13 to 4.16 a jet of water was applied, the pressure varying from 40 to 20 lbs. gradually. On application of the water to the ceiling the portion of the plaster struck immediately fell down. The concrete of floor was slightly and superficially cracked. Two days afterwards the deflection of the centre joist was measured and found to be 1⅜″. The fire did not pass through the floor."

The first thing that arrests one's attention when reading the report is (1) the shortness of the duration of the test—one hour, followed by three minutes application of water. It was certainly not sufficient to thoroughly test the materials used. (2) That when the door was opened it was noticed that the centre joist had deflected .This deflection was afterwards found to be 1⅜″. It is evident that the expanded metal lath ceiling had not fulfilled its function, which, I take it to be, is to protect the concrete and steel from the heat, or why this deflection? (3) On application of water, the portion of the plaster struck immediately fell down, conclusive proof that the ceiling is of little, if any, use. The concrete was now exposed, and if the gas had been turned on for another hour, followed by another application of water, what would have been the result? The question needs no reply. (4) Three minutes were allowed to elapse between the opening of the door and the turning on of the water—the result, possibly, of carelessness. Evidently every latitude as to time and conditions were allowed in this test, yet as a fireproof test it proved an utter failure.

Compare the severe Denver tests with the foregoing, and say whether concrete or clay is most reliable? These competitive tests were made by Messrs. Andrews, Jaques and Rantoul, architects, of Denver, assisted by Thomas, Shepard & Searing, mechanical and electrical engineers, of the same city. The conditions imposed on the competitors were:

1. By still load, increased until the arches were destroyed.
2. By shocks, repeated until arches were destroyed.
3. By fire and water alternately until the arches were destroyed.
4. By continuous fire of high heat until arches were destroyed.

RESULT.

1. The porous terra cotta arch sustained a load of 15,145 lbs., or 757 lbs. per square foot, for two hours without breaking, when the load was discontinued.

2. The porous terra cotta arch withstood four blows from a height of 6 feet, and 7 blows from a height of 8 feet, each arch dropping at the last blow.

3. The porous terra cotta withstood eleven applications of water alternately with extreme heat. Time of test, 23 hours.

4. The porous terra cotta arch, after having a continuous fire under it for 24 hours, was practically uninjured, as it afterwards supported a weight of bricks of 12,500 lbs. on a space 3 feet wide in the middle of the arch.

In my opinion, there can be no question as to the relative merits of the two materials or systems. Clay products are fireproof, concrete is not. Which of you having a furnace or oven to build would specify concrete?

Yours truly,

J. A. PROUDFOOT BULMAN,

Montreal, July 13, 1899. Architect.

The Church of Our Lady of the Rosary, Vancouver, B.C., will be heated with two Robb hot water heaters of 3,000 square feet capacity each.

A strike of the granite cutters and polishers in the employ of the Victoria Granite Company, and Messrs. Epps, Dodds & Company at St. George, N.B., took place last month. The difficulty arose out of the fact that the employers decided, without consulting the workmen, to close down their mills on Saturday afternoons during the summer months.

BRITISH COLUMBIA LETTER.

II.

THE ferry which plies daily between Victoria and Vancouver is named the Charmer, probably in a spirit of irony, and rounds Brockton Point at 8 a.m. with commendable regularity, and announces her safe arrival with a double whistle of unusually melodious tones. It is not until the Point is passed that the City of Vancouver comes into view, and the scene changes so rapidly as to render the effect almost theatrical. For an hour or so before entering Burrard's Inlet the vessel heads so directly for Howe Sound as to convey to the uninitiated the impression that somewhere within the recesses of that fine fjord Vancouver will be found lying beneath the shelter of the Lions or one or another of the fine mountains that form the brotherly walls of the Sound; but just as one is quite convinced that the Point Atkinson light house marks the entrance to the Narrows, the boat's head is swung round to the east and she steams rapidly along the shore, which is backed with wild looking broken hills covered with melancholy pine forests. Prospect Point to the south and Capilano Creek on the north, define the entry to the first Narrows, which for a mile or so resembles a wide and rapid river with many ugly looking swirls and eddies. The south shore suddenly falls away at Brockton Point and the Inlet spreads out to probably two and a half or even three miles. The ship's head is brought hard round at the Point, and there, straight ahead, lies the Terminal City of which we have all heard so much. The shore line is circular, one horn sweeping away east with a big bend towards the north, which helps to form the second Narrows four miles up, the other end wanders away to the west, meanders around Coal Harbor and the Basin, where it almost makes an island of Stanley Park, barely manages to ripple round Dead Man's Island and thence back to Brockton Point, round which we came in the delectable Charmer but a short while ago.

Moored to the wharves, which occupy the water front for a considerable distance, are several good sized liners, one of the Empresses, the Warrimoo from Sydney, a top heavy looking boat from San Francisco, a number of craft engaged in the now important northern trade, tugs, scows, a sealing schooner or two, and a big four masted barque loading lumber at Hastings mill—all give an air of life to the scene. Viewed from the water the town presents that untidy jumble of buildings that most towns do present from the back, but the imposing mass of the new C.P.R. station stands boldly out from the wilderness and impresses upon you at once its individuality and architectural importance. This building, marking as it does the terminus of the great railway system, which is the raison d'etre of Vancouver, is built on and against a cliff, the foot of which was but a few years ago washed by the clear cold water of this land locked inlet. The permanent way is probably 20 feet below the level of Cordova street at this point, the seaward front is consequently 20 feet higher from ground to sky line than the Cordova street elevation. The building consists of a well proportioned central block with wings right and left; this central or main block rises high above these latter, which are reduced to comparative insignificance by the towers marking the south east and south west angles of the main building which is finished with the steep high pitched dormer dotted roof of the Francois I style, which has been successfully adopted and adapted by the architect. The main entrance from the high level is arched with one broad segmental sweep which abutts upon the towers, but the want of light seriously detracts from the effect of the fine span and voussoirs; indeed, both the wings and the entrance would have gained enormously in character had their height been somewhat greater. The interior of the structure is so far from complete, no opinion can be formed regarding it.

The stranger entering Vancouver from the sea or by rail cannot but observe how narrow and steep is the ill kept approach to the higher level, but for the most part the chief streets have been paved with asphalt which is breaking up badly, or with wood blocks, which, here as elsewhere, are proving vastly superior to the asphalt. Once leave the main streets and the thoroughfares prove to be very indifferent and often very bad, but the wooden sidewalks are invariably in good order and it is pretty safe to prophecy that the roads will be much improved. So many new ways are being made and so great a mileage maintained, it is not expected that a high degree of excellence should prevail. Vancouver is essentially a city of contrasts; things have not had time to even up, and one finds it far from easy to justly criticise this half developed but lusty child of the west only now emerging from the callow stage of extreme youth, and must be regarded more from the standpoint of what it is becoming than from what it is. The place is full of go and energy; shipping comes and goes in ever increasing tonnage; existing streets are rapidly filling up and new ones extending in every direction. Seven banks, most of them in premises of their own, are doing business here. Lumber and shingle mills, sash and door factories, iron works, sugar refinery, boat building yards and many other industries testify to the healthiness of the growth. The most important business streets, Hastings and Lower Granville, Cordova and Water streets, have vastly improved of late—the once great gaps between the blocks are closing up with fairly substantial buildings of from 2 to 4 stories in height.

It is not possible to approach the street architecture of Vancouver in more than a very general manner, giving impressions rather than detailed criticisms. Many buildings are worthy of far more than the slight reference here made to them; some are doubtless overlooked; others are best left severely alone, being, it is hoped, the result of a temporary aberration in taste. A large proportion of the work is, of course, uncompromisingly utilitarian and commonplace. Nearly the whole of the street buildings erected prior to 1895 were designed to meet conditions which are soon to be of the past, but the banks of British Columbia, of British North America and of Montreal are conspicuous exceptions. The first is chiefly distinguished by the boldly arched series of openings on the ground floor and a well handled corner entrance and oriel window. The upper stories are in brick and do not show the vigorous handling of the lower one, but the detailing throughout is refined in a certain school of English Renaissance. The bank of British North America is a well considered massive building in a severer type of Italian, dignified but cold in effect, finely constructed throughout of a hard sand stone that lends itself well to the style. The bank of Montreal is a particularly picturesque composition in modern English Renaissance; the lower floor only is utilized for the purposes of banking, the manager's residence occupying the rest of the building, the two-fold nature of which is admirably expressed in the treatment. The architest has evidently dwelt with loving care over his work, and as the peculiar attraction of this delightful style lies much in the unlimited scope it affords for the application of beautiful detail with great freedom in its handling, it naturally follows that the lover of such will here find plenty to linger over. The grouping of the tower, gable and chimney in the south-west is very clever.

The block of buildings serving as temporary quarters of the C. P.R. is said to be by Bruce Price, but it seems incredible that anything so downright commonplace is to be attributed to an architect of such wide experience. The entrances are mean in the extreme; the scanty little cornices are overwhelmed by the mass of untutored rock they are supposed to relieve, and the most ardent admirer of the uncouth piling up of roughly quarried stone could scarcely enthuse over this example.

The Hotel Vancouver perplexes the wayfaring student of architecture, for it is hard to account for the contrast presented by the old and new blocks. The first, which fronts on Georgia street, is evidently wanting a western wing, and gives one the impression of being the skeleton, as it were, of some well balanced design stripped of all ornamentation and carried into execution by some wholly unsympathetic hand. The second or Granville street block is simply a big brick wall with rows of openings in it—is about as interesting as a respectable tea warehouse in Tooley street, for the passer by might reasonably conclude, but for the height of the storeys, that this triumph is a bonded store. A small entrance on the Granville street front is evidently by a different hand, and though quite out of feeling with either block, is in itself a pleasant feature. Internally, the entrance and the first stairs to the galleries surrounding the top-lighted hall are all good and effective. The great bare dining room sadly needs clothing with color, and a deep, well modelled frieze would greatly improve its proportions.

Next in point of size to the hotel, but in an altogether different class, is Molsons Bank. The facades are executed in the rather sad colored stone that comes from Calgary, but detracts nothing from the dignified proportions of this fine work, which is simple almost to austerity, standing alone in this city as an example of what can be effected without having recourse to the rock-faced affectation. The sparingly used ornamentation is a little flat, and valuable relief is afforded by the broad and deep copper cornice and the attached columns of the uppermost storey. The style adopted is perhaps best described as American-French Renaissance. The unfinished interior, with oak wainscot and linings (much more English in feeling than is perhaps consistent with the character of the exterior), gives promise of great things, though

the deeply coffered ceiling of the banking hall is crowded, wants breadth, and is not well executed in detail. It may safely be predicted that many a day will pass ere Molsons Bank yields pride of place among Vancouver's business premises.

There are at least two new buildings which rival Molsons Bank, but in size only, for they cannot be regarded as rivals from an architectural standpoint. The Fairfield block is a plain, four-storeyed erection without any peculiar claims to our attention, being simply a series of bands of brick alternating with courses of stone—rock-faced, of course. The lintels over the stairs are supported by plain, rectangular, cast-iron posts; the thin looking stairs in the nature of label molds over the arched openings of the third floor do not work in happily; the galvanized iron cornices have a "stock pattern sheet" appearance, and are quite out of keeping with the somewhat rude character of the structure. The worst features are the entrances, which are extremely elementary in conception.

A number of new buildings have been erected and some others are in course of erection. Few are of interest, some being merely sheets of glass framed in white brick and galvanized iron, rather resembling two-dollar looking glasses, and doubtless are as serviceable as they are ugly. However, in more than one instance the architect has boldly enclosed the upper storeys with a slightly stilted semi-circular arch sweeping from outer pier to outer pier, and, by a careful treatment of the diminishing fenestration, has shown that utility and unmitigated ugliness can be divorced. There appears to be an insensate rage for glass, not only in the store fronts, where its presence is, of course, absolutely essential, but in upper storeys used not as show rooms but as offices, where the excessive quantity of glass is quite uncalled for, being a positive nuisance to the tenants in the summer and a strain on the heating system during the winter. From the artistic point of view, what can be said in favor of a material which, the better its quality, the more nearly it resembles a void?

Strange to say, we noticed, besides the Bank of Montreal, the old Hotel Vancouver and the C.P.R. buildings, but one other business building with a roof! Everywhere is a dreary wilderness of decks. Why hide a roof, which of all features is capable of such varied treatment? Certainly the style of building most in vogue is not one that would lend itself readily to visible roofing, but in this mild, moist climate it does seem strange that the deck should be preferred. The necessity of keeping down the cost is doubtless the reason in some cases, but there seems to be a feeling prevalent that a building with a framed roof in evidence has not a business-like appearance, which is ridiculous enough. None the less, the western mind objects to a skyline broken by aught but jogs and steps, for the same fathomless reason that causes western engineers to build roads and streets in rigidly straight lines at right angles to each other. Even the roads which lead out of the city and through the woods are driven straight ahead, regardless of natural contours, resulting in highways not only wearisomely monotonous but distressingly steep, entailing engineering difficulties which might have been frequently avoided and always lessened by sweeping around the bases of the hills. Do western engineers wish us to believe that "there is no use," let alone beauty, in a curved line? But this is a bad digression.

If it were difficult to convey the impression received by a visitor of Vancouver's street architecture, it is still less easy to sum up the result of a necessarily somewhat cursory review of the domestic building. One first notices that the lots are small—so small in some parts of the city as to be suitable only for the erection of houses in pairs or in terraces. Some few houses stand in 132 × 132 feet, though in far too many instances two—and even three—houses are crowded into one lot. It will at once be understood, then, that we need not look for "places" in Vancouver with the lawns, shrubberies, good trees and shady walks, lodges, stable buildings and so forth that are comprised in what are commonly designated "grounds"—for of these there are none. Years hence, when the bush-covered surrounding country has been conquered and cultivated, this serious lack of space will be overcome. At present no man can set his house back one hundred yards from the road unless he goes into the woods, for the city limits are ambitious in extent to the last degree, and embrace an area great enough to accommodate a round half million of people. The development of the town site is consequently not concentrated, and embryonic roads and sidewalks stretch away out into the black stumps in an aimless sort of way.

The type of dwelling most favored in the west end is a two-storied weather-boarded structure, with eaves projecting as much as three, and even four, feet from the wall line. The shingled roofs are usually gabled. The design is based upon the American Colonial, with the exaggerations of the style intensified, and its many elegancies and possibilities in refinement and the picturesque pretty completely lost. Cheap expediency is writ very large in some, and vulgar ostentation in others. It must not be concluded, however, that much of a different character is not to be found, only that it requires searching for among the multitude of commonplaces. The meagre size of the building lots positively bars any building in the broad, spreading manner characteristic of so much fine modern work, a manner which conveys an impression of ease, comfort and elbow room quite beyond the ken of lots which run from five to fifteen to the acre, and frequently subdivided at that! Such sites as these are, indeed, more suited to downright street architecture than to the semi-rustic timber houses which are crowded into them. It is no uncommon thing to see a house, which, having scarcely passage room around it, has none the less a piazza 8 or 10 feet wide within a few feet of the sidewalk. No thorough consideration of such important points as prospect or aspect is possible, neither, indeed, does it appear that any consideration at all is afforded to them in the vast majority of cases. The extreme newness of everything, too, is against both the houses and their surroundings, which sadly need the ever beautifying touch of the hand of Time. One cannot enthuse over brand new stone walls, shiney painted weather boards and precisely tuck-pointed bricks, unless one is a real estate agent or builders' supplies merchant. Fortunately, trees will grow and hide, or at least decently veil, much that is bizzare, or flat and uninteresting. Stone and brick will mellow, ivy creep and roses cluster, in time—all in good time. For the present the lover of the picturesque will find little enough for sketch book and camera among the houses with tarred roofs and French grey weather boards. This same practice of tarring shingles with coal tar is nothing short of barbarous. Surely such violent contrasts are not desirable—the gloomy nature of the climate perhaps inclines one rather to bright than sombre hues—but black, French grey and white is coming it strong. With such fine tones of red, golden brown, silver grey, moss green and ivory, to which shingles and weather boards quite naturally lend themselves, it does seem a thousand pities to disfigure them with coal tar and such paint. If tar is really with some a sine qua non, why not use Stockholm, which affords deep, rich, soft, brown tones, and is a better preservative than the nasty black stuff.

The great projection often given to the eaves is no doubt dictated by the climate, and affords a useful shelter to the upper windows from the drenching and long continued rains, but the treatment of this novel feature is seldom a happy one—horizontally sheeted soffits supported on skinny looking and altogether inadequate consoles being the rule. Those interiors we have been given an opportunity of seeing are for the most part disappointing. Houses with such expensive features as broad piazzas, heavy turned columns, much begabled roofs, circular bays surmounted by towers, etc., are frequently, nay, generally, finished internally with a meagreness quite out of keeping with all this outside show. The contrast sets one thinking of—well, all sorts of things—and it is distinctly amusing to hear that the owner could not afford to pay for more ornament, such as a beam ceiling, some cedar wainscot, tiles on his porch floors, and had to forego a little parquetry, all wall papers, a coat of paint or plaster even, on account of cost—and this with his house stuck as full of circular bays, plate glass, balconies, gables, turnings and so forth as could be crowded on!

It must be borne in mind that this is the west, and that there has not been sufficient time to evolve a standard in matters of taste. There are no old established interests, no cultivated leisure class. The town does not possess a museum, much less a gallery of arts, not even a fine arts society. Every man is fully occupied in making a way for himself, and until he decided to buy a lot and build a house, probably never gave two thoughts to building. His idea of what constitutes the calling of an architect is a beautifully mixed one, and consequently, in his utter ignorance, turns to what he is pleased to call a practical man, with the hapless results that defy criticism. That bogey, the practical man, is ever the most hopeless, unpractical—knows nothing of planning; his designing is not less ridiculous than his planning or more feeble than his drawing; his vaunted practical knowledge is invariably confined to the one trade he followed before he started speculative jerry building operations on his own account.

A stranger visiting Vancouver a few years hence will be able to form a fairer estimate of her architectural values than it is possible to form at present; all is too recent, too absolutely new and hard to be yet judged. Houses which look terribly out of place now, may, as the development of their surroundings proceeds, prove to have been less unhappily conceived, and with increase of years will come a greater appearance of permanence, that which is now so distinctly wanting. But a few years ago the site of the city was an unbroken forest. The first great change came with the falling and sweeping away of the timber, which converted the woods into a melancholy sea of blackened stumps The second transformation is now taking place, and it is only possible yet to get glimpses of what is being brought about. In the meantime everyone who clears a lot or two, plants a few trees and creates a garden, however tiny, is doing a good work, for he is helping to obliterate the scars of wounds inflicted on the face of Nature.

RHYTHM IN DESIGN; OR, THE ANALYSIS AND APPLICATION OF HARMONIC FORM.

By F. Bligh Bond.

I will now enter properly on my theme, starting with this definite and all-important contention as the groundwork of the whole—namely, that there exists in the human mind a power of perceiving harmonic ratio in line, and interpreting it as beauty, precisely as it interprets the effect of harmonic vibrations in sound (as music) and in rhythmic motions; and that it is this power which, consciously or otherwise, lies at the root of all our perceptions of abstract beauty in line and form, and of the sensations of pleasure which may be derived from contemplating it. The existence of such a power may be doubted by some, and no doubt the suggestion may be repugnant to many others, who would prefer to believe that no mechanical laws can bind their sense of the beautiful, which they would regard as belonging to a domain higher than any exact science could carry us, and perhaps an endeavor to lay down such rules would seem to them almost like sacrilege—a degredation of ideal things to a commonplace or materialistic level. The reality, to my view, would be the very contrary, and if, by any effort of mine, I could lift this subject ever so little out of the hazy and chaotic condition it is in at present, and show, beyond all possibility of disproof, that the same fixed and immutable principles underlie our perception of harmony or rhythm in form as in music, I should feel I had helped to lay the foundation for a future appreciation and enjoyment of rhythm in design of a conscious, intelligent, and reasonable character.

I wish to emphasize, by a further allusion to music, my answer to those whose sense of the ideal freedom of artistic design would take alarm at the idea of any mechanical or fixed law obtruding itself into their Elysium. I would ask them to consider whether, if such a law be demonstrated, it need after all involve any restriction or degradation of their ideal freedom of design. Would it not rather furnish them with an intelligible and secure basis on which to raise their work, and give them a test of the correctness of their instincts in interpreting beauty in form? Has the art of music suffered at all from the discovery or application of the physical laws on which musical harmony is founded? Certainly not. The best composers distinctly owe their success in finding expression for their ideas, and thus in producing lasting work, to that ability to translate and interpret the dreams of their genius which is given them by a sound education in the grammar and machinery of harmony.

There have been many schools of musicians, and their respective teachings have no doubt varied within wide limits, but I venture to assert that they would all be in agreement on the necessity of a complete grasp of musical theory, harmony, thorough-bass and counterpoint, and also a knowledge of the physical side of music, of the relationship and nature of different vibrations, before a pupil could expect to become a master, or venture to launch his compositions before a critical musical world.

Why have we no such grammar, no such system of harmony in design, when the perception of harmony in form and discord in form is equally with us, and equally intense in some of us, and, as I verily believe, only awaits systematic education to emerge from the unconscious to the conscious stage? Surely this is a matter for surprise.

There is a broad and marvellous field of delicate and subtle perceptions lying open to us, inviting our investigation, offering rewards of great delight, and how many among us have eyes to see what is there? I fear many of us are gazing into it through the medium of empirical ideas and the distorted views of quack designers. We hear, and heed too much, the sentimental vaporings of artists and art critics, and of all those who, having approached the subject of design from its emotional or poetic side, have discerned no system, or at best only the scattered fragments of one. Are such to be our guides towards a rational understanding of harmony in form? Is this chaos to last?

If the artist or architect could but learn a coherent system of music in form, how vastly would he, and the public for whom he caters, be the gainers, by the increased certainty and lucidity of his work, and the strength and delicacy of his interpretations, and he personally, in the power and delight which his knowledge would then afford him of creating things of beauty.

I have stated that I consider the perception of harmonic ratio in form to be a power latent in us all, though undeveloped, and I think the truth of the proposition can be easily established by reference to some of the simpler harmonic forms, in which the instinctive recognition of harmonic quality and mathematical correctness is developed in most of us to a great degree of refinement, so much so that we are able to recognize the very slightest visible deviations from the perfect form. I refer to the circle and the ellipse. What is true of these simple forms is equally true of the more complex, because these are of essentially the same nature, and we can easily educate our perceptions to be sensible of an error in a complex curve, by care and attention. The power is capable of development to any extent, and only needs systematic cultivation, whilst its increasing refinement and delicacy of operation yields a proportionate degree of pleasure and satisfaction, undreamed of by those who have not studied the subject. We ought in the future to be the possessors of a large number of new perceptions of great delicacy and exactness, and to feel and be stirred by music in form as we now feel it in sound. We ought to be able to discern and reject at a glance, as discord, any deviation from harmonic laws or incongruous or unsuitable juxtaposition of different orders of forms, just as in music we not only take care to observe the laws of harmony, but also take pains that in the orchestration of a piece, the "timbre" of the sound given by the different instruments is properly apportioned and blended, and also that the performance is not marred by the introduction of incongruous movements, such as would present a contradiction in mood or feeling.

Our sense of harmonic correctness in line will, I believe, become capable, after education, of being applied with so great an exactness that almost a hair's breadth deviation will appear to us as an unsightly crippling of the perfect form.* The truth of this proposition may be made familiar by some means of systematic experiment, such as are offered us by the various kinds of harmonographs for the transcribing of musical or

* The substance of this essay was comprised in a paper read before the Bristol Society of Architects in January, 1899, but it has since been to a great extent rewritten, and is reprinted in abstract form from the Journal of the Royal Institute of British Architects.

* I am informed by a friend who has considerable knowledge of India, and experience of native workmen, that the trained castes of designers who produce that truly harmonic and mathematically perfect work in inlaid marble or wood, which delights the whole artistic world, are not in the habit of using any mechanical or mathematical appliances for the working out of their rich designs, but prefer to trust to the safe guidance of their marvellously developed instinct.

acoustic curves, or the resultants of compound pendulum vibrations. These most interesting and instructive little machines are not nearly so well known as they deserve to be, but with their aid I have sought, and have found, a perfect correspondence beween mathematical correctness and and æsthetic value, in all the forms which have come under my notice ; and having tested the effects of some thousands of these lines upon my own perceptions, I have fully satisfied myself not only that in our recognitions of abstract beauty we are fully under the dominion of those permanent mathematical principles of ratio which rule in the physical domain, but that these principles, in their application, might be to a large extent classified and formulated by the use of the designer, and a grammar of harmony constructed.

The most lamentable result of the want of training of the harmonic sense is that we are by no means so sensitive as we should be about the employment of crude and makeshift forms, and our natural delicacy of perception has been blunted by the adherence to false rules and unworthy models, whose sole merit has, in many cases, been their antiquity.

What perceptions of form Nature has educated us into by inviting us to observe the growth of herb or limb, we have to a great extent corrupted by the blending of natural or harmonic forms with those of a geometrical or hard mechanical sort, in ways utterly unnatural and utterly preposterous, until now many of us do not know a good line from a bad one. There is, of course, speaking of geometrical forms, always an exception to be made where architects are concerned, for building conveniences demand a certain squareness and angularity of outline ; but I contend that a skilful architect, knowing his grammar of harmony, would never be mastered by such conveniences, but, whilst duly respecting them as necessary conditions, would always, in his designs, rise superior to them, and make them subservient to his harmonic scheme, when they would be traceable only as basic forms, lending stability and repose, but whose nakedness is draped by the skilful hand of the designer, so that their severity is lost, whilst their vigor is retained.

I have now reached a point at which I must try to clearly define rhythm. I will try to formulate (1) its nature, (2) its application to design.

(1) Rhythm is the effect of natural motion or motions having periods bearing a definite ratio to one another, acting in a given direction, and combining to form an harmonic sequence or series of movements.

(2) Rhythm in design is the art of registering and applying or adapting the forms created by the interaction of these natural motions in their various phases ; the sequence of their relationship being thus tabulated as a curve, so that the eye may simultaneously grasp and understand the whole period of the movement, such curves forming the basis upon which a complex design may be built up.

From the foregoing we deduce the following :—

(a) Every line is a progression and should be viewed as such in order to be truly understood.

(b) Every true line, except the absolutely straight line, is an harmonic progression, and pictures the operation of a force or forces. In its dynamic nature lies its vitality, and its artistic character is directly dependent upon its correct representation of force.

I will also add :—

(c) Every complex line or curve possessing the above nature has the attribute of beauty, the eye perceiving the consistency of the law governing it.

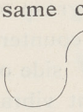
(d) The arbitrary juxtaposition of curves following different laws, or not containing the same harmonic elements, is inferior in beauty and in force or vitality, the eye detecting as discord the divergence in principle.

I could illustrate by abundant examples both these latter rules which I have postulated. But a few considerations, by way of illustration, are all that will be necessary for the present, and I think both principles will be found easy of application if a little study be given to them. Let me ask you to make a collection of all kinds of harmonic curves, and study them intelligently, tracing the direction of the forces of which they are the resultants, and you will soon begin to acquire what I may style the "dynamic sense," which is really a more intelligent development of the "harmonic sense," by which we instinctively perceive beauty. The application of these to design will become easier and more certain. Especially in designing wrought-iron scroll-work will the process be found beneficial.

But before studying complex curves, there is much to be learned from the careful consideration of the simplest harmonic forms : the circle, ellipse, spiral and parabola. Of any of these, we seem to be licensed, by our intuitive sense of what is proper, to take parts only for use in architectural and general design, or, if desired, to put two similar segments of the same curve in opposition, as in pointed arches, foiled circles, ogees, etc. What we are not entitled to do is to produce a mongrel curve, simulating a complex harmonic curve, by joining together, end to end, portions of simple or circular curves. This is an important rule, generally disobeyed, especially in late Gothic or Renaissance designs. The instinct of designers would seem to have been sadly blunted, or to have gone much astray, when they could be satisfied with such mongrel or crippled curves as these very generally are.

Let my rule be applied, for instance, to that most hideous of curves, the so-called "three-centred ellipse." This curve is without consistency, following no uniform law, and therefore destitute of dynamic vigor. Its effect on the really sensitive eye is quite painful, yet it passes muster frequently among latter-day architects.

In respect of the more subtle and sophisticated "five-centred ellipse," most of us have not our harmonic sense sufficiently attuned to feel its harshness. In the same bad category I must place the Tudor four-centred arch, and all those ogees which are compounded of circular curves of varying radius.

Neither is the combination of two segments of the same circle in contrary flexure a satisfactory one  . It is far from being as pleasing as Hogarth's line of beauty, which follows a uniform harmonic law from end to end—that is, it represents the whole period of a certain complex vibration.

Not to unduly multiply instances, I will content myself with mentioning one of the worst transgressions of all—namely, the junction of the circle and the straight line. Frequently one sees what is called a flat arch—that is, having horizontal voussoirs, and to this is given rounded corners. The form may have conveniences, as

all straight lines are convenient—too convenient, alas! —for builders, but where is the excuse? A very slight alteration would restore to the line an harmonic quality. The Burgundian architect effected this by the very appropriate use of a counter curve in the centre, almost annulling the straightness of the remnant of the line.

I must now revert to the basic or geometrical forms, which are founded on the straight line. Architects can never ignore these. It is impossible, and it is not desirable, that we should get quite away from them. Architectural construction, which is dependent on equilibrium, can never violate the laws of stability in the mass, and therefore squares, levels and perpendiculars will form the framework of building for all time. But if architectural with general design is to be regarded as the expression of living forces, as may be inferred from the rules I have laid down, then it becomes a question how we are to confront and deal with those basic elements of straightness and rigidity which are in themselves dead, and devoid of rhythmic energy, and are, as one might say, the skeleton within the living flesh.

Straight lines in their absolute nakedness are expressive only of passive stillness and monotony. An ornamental arrangement of straight lines only can never satisfy, though under certain conditions it may please, but you will most assuredly find that the pleasure to be derived from straight lines is not a positive pleasure at all, but at best an agreeable feeling of reaction experienced by way of contrast after the eye has had an overdose of luxuriant curvature. The use of the dead square line should, I think, be reserved by future designers for tombs, mausolea, and such-like temples of death, as an emblem of eternal stillness and inflexible destiny.

Nature gives us no argument for the use of the absolute straight line, as no natural line is really straight, but, from some point of view or other, will be found to possess subtle curves. Her lowest order of forms—the crystalline—produced by the action of simple molecular forces, is constructed, it is true, upon a geometrical basis; but they all present, in the natural state, certain irregularities of outline, which redeem them in the mass from absolute monotony.

In the vegetable kingdom the rhythmic expression of the living forces of growth and expansion comes into fuller play, and the characteristic outlines indicative of the vital forces peculiar to each herb becomes more complex and beautiful as we ascend the scale of evolution. In the infinitely varied outlines of growing things we detect a harmonious working out of two forces—the alternation of development and restraint, or the lines of interaction between energies of opposite tendency, giving us a variety which can never stale.

All these forces, together with the pendent curves produced by gravity, and the perception of continuity of structure, are translated by the inner perceptive faculty as harmony, and conveyed to the inner sense as beauty.

Reverting for a while to what I said concerning the use of square lines in design, and the inharmonious result of a mere mixture of straight lines with curved ones, I cannot of course be supposed for a moment to advocate a wholesale departure from straight lines in design, nor do I. But there are two ways of using them, having markedly different optical results. If used unskilfully in, let us say, an architectural design, the straight line will assert itself among countless other features very clearly, and its native harshness will not be disguised; and why?—because it is not combined or interwoven with lines of other tendency, so as to suggest to the eye any more harmonious line formed by the sum total of all the features. It is all the difference between a mechanical mixture of two different elements, and their chemical combination. But it is possible, and easy enough if proper care be given, so to regulate your smaller features in a design that they may form a series of points upon a general "line of suggestion," the effect of which upon the eye will be sufficiently obvious to withdraw attention from the rectilinear backbone, and the severity will disappear. The minor features yielding the chosen "line of suggestion" must be of sufficient size and frequency to form a well-marked series, but they need not in themselves take any particular shapes so long as they are of the right projection. Their individual shape does not count in the total effect, except in a secondary manner. In one direction only, the horizontal, does the unadulterated straight line appear to be correct and satisfying, and the reason for this appears to be that the straight line is expressive of constant or uniform motion, which is a kind of motion only natural in a horizontal direction.

Vertically all propulsions of force are subject to the laws of gravity, causing progressive retardation in rising, and acceleration in falling, yielding more or less parabolic figures, and I feel quite clear that, unconscious though we may be of the existence and requirements of our "dynamic sense," it is always urging us most strongly to obey these laws in design.

I feel I ought to make one exception, in favour of the use of the vertical straight line in a limited manner, and that would be when it is used in the formation of a pendent. In such a feature my rules would permit of its use, as it there symbolizes a constant force acting vertically downwards.

I now wish to speak briefly on the subject of the simplest and most elementary of harmonic lines—the circle. This beautiful figure expresses either of two sorts of motion, and can be built up from each. It is formed:

(1) By the motion of a point at a uniform distance about a centre.

(2) By two rectilinear motions of equal period and extent, acting upon the same point at right angles to one another, and alternating in time.

The circle, or sphere, is the simplest of natural forms, and very close and perfect approximations to it are found in organic nature. But though it is the parent of all other graceful forms, it is not fitted for indiscriminate use in design, on account of two characteristics:

(1) In general design, because of its monotony.

(2) In architecture, because it is not a form subject to the laws of stable equilibrum.

The latter objection applies, of course, only to spherical or circular masses, not to circular spaces, as these, having no weight, cannot offend the law of equilibrium.

Parts of circles, or parts of spheres, are, however, a matter of everyday use and convenience, and were it not for their extreme and sometimes painful monotony, might be considered the most essentially useful element in architectural design. The ease with which purely circular forms may be struck, as distinguished from the more complex harmonic sweeps and curves, tends to make them permanently popular, and long custom has rendered them traditionally correct.

We have next to consider the elliptical form, which is directly derived from the circle, as the circle yields

the ellipse when viewed in perspective. Here we have a really rythmic form, and the trained eye traces with interest, as well as with delight, the interaction of the two forces which produce it: the vertical, which is retarded or lessened by insensible gradations as the crown of the curve is reached; and the lateral, which is correspondingly accelerated or increased. Every part of a true ellipse is musical in form, just as its counterfeit (of compound circular origin) is harsh and discordant.

It is a wholesome sign of the progress of refined sensibility amongst modern architects, that they are beginning more generally to appreciate the beauty of true elliptical forms, and to make use of them.

In the same category as the ellipse I will place the parabola, which is of kindred nature, though an open curve, and is one which may be used in its entirety in architectural work (as, e.g., in forming a "line of suggestion" for the general skyline or contour of a group of buildings, or large building with numerous salient features) in entire accordance with the laws of stability and equilibrium.

The parabola is the product of various combinations of natural forces, but for our purposes may be regarded as the resultant of two simple vibratory motions—the horizontal one having exactly twice the period of the vertical one. It is a curve which is most delighttul to the eye, and thoroughly well fitted for application to architectural design, especially in roofs and skylines.*

From the parabola, it is an easy step to the more complex harmonic lines which are the resultants of two or more forces of other ratios than 2: one acting upon one another at right angles, and with various amplitude. In some of these now in my possession, executed by the mechanical means already suggested, or by the simple mathematical process of plotting the curves on squared paper, the effect is almost magically beautiful—the most characteristic being those in which, upon the basic form of the ellipse, parabola, or lemniscate, there are grafted subtle variations produced by the presence of higher harmonics in a subordinate degree—precisely analogous to those strictly subordinated harmonies which in musical instruments yield such varying "timbre" with the same basal note, and which give to the different instruments diverse tones—hard, soft, liquid, mellow, metallic or brazen, full, thin, rich, reedy, etc. All these have their counterparts, more or less recognisable, in the character of lines. It is a fact well known to science that each of these qualities in a musical instrument is the direct result of a particular selection of certain harmonics in certain degrees of strength, accompanying the fundamental note; and so far-reaching is the law that it controls even the formation of vowels and consonants, which have all been successfully imitated by the incorporation of their proper harmonics.

In the same way, by skilfully blending and applying the harmonic principle to lines, we can give them an expression of force or feebleness, richness, wiriness, rigidity, flexibility, grace, sternness, and what not; but to be able to do this with certainty and clearness of expression, we should have a conscious knowledge of the laws which we are calling into operation.

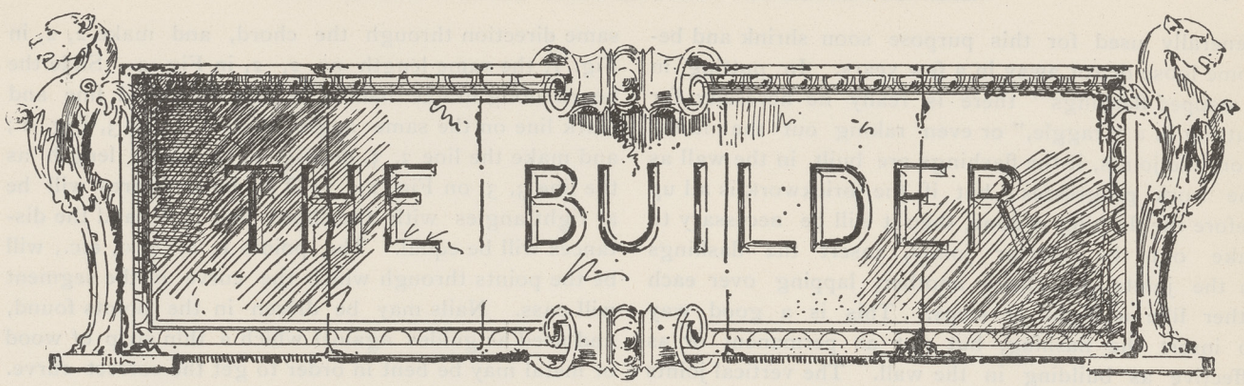
Having indicated that the character and artistic value of a line is the outcome of harmonic elements properly selected and applied, I now come to speak of what we call "conventional" design or ornament.

Conventional representations of any well-known class of forms is merely the arbitrary choice of those harmonic principles in a form which gives it its distinctive character, or "timbre," or, if I may so term it, "flavour." In all natural forms there are essential characteristics which are the result of the working of special harmonic principles, besides a great many variations of a more intricate kind which are the outcome of accident or circumstance. It is the business of the conventional designer to select the one, and to discard the other; and this sorting or weeding-out of the essential from the non-essential preserves, as it were, the soul of the form, whilst rejecting its material part.

Conventional representation (like time, tune, and orchestration in music) is therefore an orderly classification which conveys to the æsthetic sense a clear, select, and definite impression easily understood at a glance. If then, as we have seen, our appreciation of the simpler harmonic forms as found in the vegetable world depends to a very large extent upon our conception of the growth, movement, and special vital characteristics of the different orders of plants, then, in a similar way, our appreciation of beauty in the higher forms of man and animals depends upon our knowledge of, and our ability to understand, the various powers and capacities of movement which the position and sizes of the muscles, or the proportions of limbs and trunk denote. But with animal and human types, architectural art has little or nothing to do in its structural portions, as it is an art expressive of fixity in position, whilst these forms are entirely expressive of, and characteristic of, locomotion. There are, therefore, very few instances in which the incorporation of the human form as an architectural feature can be regarded as even a qualified success. Those great sitting giants forming the facade of the rock temple of Abu Simbel in Egypt are, to my mind, about the most legitimate, or least unsuitable, instances of its application. From their stupendous size and massive breadth of treatment, as also from their resting posture, they have a certain appropriateness inspiring a sense of repose, stability and permanence, and thus seem to satisfy that sense in us which looks beyond the material or concrete expression, and, as I have endeavored to show, sees in the humblest line a symbol of those eternal vitalities which throb ceaselessly throughout the visible world, and whose music is intuitively felt by us, although we have not yet arrived at the full and conscious recognition of it in all its manifold presentments.

A remarkable project has been, according to the Plumbers' Review, London, undertaken by the West Australian government, namely, to lay some 328 miles of water pipe, made of steel spiral embedded in concrete. In the manufacture of this pipe the sheet steel, after being cut into strips of a width varying with the required diameter of the pipe, is rivited or welded into a continuous strip of the required length; this strip is then fed automatically into the pipe-making machine, and during its passage through it the rivet holes are punched, and the laps of the edge of the strips are brought together under pressure and held during the process of riveting. The rivets are all set by compression. The edge is slightly recessed, throwing the lap on the outside. In this way the inside diameter of the pipe is maintained evenly throughout the entire length. To render the pipe water-tight on leaving the machine, special hydraulic cement is inserted between the laps before riveting.

* The chief source of that extreme sense of refinement conveyed by Oriental architecture is the general use of parabolic or cycloidal curves in preference to circular ones.



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Warm Frame Houses.

There are three methods of protecting the walls and floors of frame buildings, so as to make them almost frost proof, and which are simple and comparatively inexpensive. First, the floors must be laid in either one of the following ways: Nail strips 1 x 2 inches, along the sides of the joists, about two or three inches from the top edge. On these strips lay a false floor and nail well; then fill in with lime or cement mortar to the level of the joists. When dry, lay over this two thicknesses of heavy felt or building paper, and lay the finished floor over all. Or the joists may be covered by a solid matched floor, well nailed, then lay two thicknesses of felt, and lay the finished floor over all. A third method is to strip the joists as mentioned above, then lay false floor, on this lay tarred felt paper, seeing that the paper runs up the sides of the joists and laps over their edges, and that all the joints of paper are well broken. Fill in with lime mortar to top of joists and over this lay the finished floor. The first method is the better one, but either of the other will answer very well. For the walls, in which the studding is assumed to be 2 x 4 or 2 x 6, cover inside and out with surface boards and then covered with felt or other good paper well lapped over and nailed. The outside may be sided or it may be roughcast, and the inside may be "furred," and have 1 x 2 inch strips nailed vertically 26 inches from centres, and be lathed and plastered in the usual manner. A second method is to build solid brickwork between the studs three feet high from the sills, or fill it up that high with concrete. Strip the studs vertically on the sides wifh 1 x 2 inch strips, lath on the strips and plaster in between the studs. Board inside and out, and cover with paper, and finish same as in previous method. For a third method, sheath the studs inside and out with inch boards; cover outside with heavy dark canvas, painted one heavy coat of lead and linseed oil. Before inside sheathing is put on, cover the sides of the studding and the back of the outside sheathing with tarred felt paper, starting on face of stud, thence on side of stud along the sheathing, out on side of stud around the face, and so on, in and out, forming a perfect air chamber; put a lath on all joints, which must be vertical and close. Prepare the first floor and ceiling joists in any of the methods described for preparing the floors, and if the work is well done, the building will be as warm as the best brick house in winter, and as cool as any stone building in summer. In the construction of the roofs, well tarred paper under the shingles, and lath and plaster between the rafters, right up to the ridge, then rough board under the rafters, nail on paper, then lath and plaster as usual. Do not bring windows close to the floor, and see that all the joints around window and door frames are made close and tight. When using felt paper see that the laps are perfect around all frames and openings and that all joints are well nailed close. The warmth of a house depends very much upon the care taken in fitting everything about window and door frames close and tight, and having the paper carefully "tucked" into and around all angles.

About Flashings.

In most specifications there is inserted a clause which says: "All necessary flashings must be put on in the best manner," but other details are generally omitted, and the metal worker or carpenter generally put on such flashing as they think are "necessary," and the matter generally ends there, until the roof commences to leak and then there is trouble and extra expense which the owner has to pay. Often, even the material to be used is not specified, and the contractor, as a matter of course, makes use of the cheapest material he can employ so that it will cover the "necessary" clause in the specifications. The very best material for flashings is copper, as it is almost literally indestructible, but, copper flashings are costly, and therefore cannot be employed only in the most costly buildings. Lead makes excellent flashings and it is so pliable that it may be bent to almost any shape without injury. Zinc also makes good flashings, and may be used altogether for flashing hips and valleys. For valleys, the zinc should be made in one piece the whole length of the valley, and should never be less than sixteen inches wide. It should be soldered at the joints, and tacked to the roof boards at its edges, at long distances apart. In some cases, however, it is best to put the zinc in three or four pieces, if the valley is very long, as the expansion and contraction of the metal, if very long, will be apt to break the flashings from the nails, and tear away from the solder at the joints. Where the joints are not soldered there should be a good long "lap" in order to prevent water from backing up and causing a leak. Long strips of flashing should not be used when the flashing is being done against a brick wall, where the edge of the flashing is bent over to be tucked into a reglet groove or "raggle" which is cut in the stone or brickwork of the wall six or more inches above the slope to the roof, and parallel with it. The efficiency of this kind of flashing depends altogether on the care with which it is done. The effect of heat and cold alternately on such a flashing is to warp it until it springs out of the "raggle" either at one end or in the middle, letting a stream of water run down into the rooms below, and this can only be prevented by cutting the groove quite deep, an inch or so, instead of the half inch that is common, turning in the flashing to the bottom of the groove, and wedging it in firmly with slate chips and Portland cement. The wooden chips

generally used for this purpose soon shrink and become loose or rot away in a few years. In putting in "stepped flashings" there is really no necessity for cutting in a "raggle," or even raking out the mortar from the joints, if the flashings are built in the wall as the work progresses; but if the brickwork is all up before the flashing is done, then it will be necessary to rake out the mortar joints, insert the flashings in the joints one above another, lapping over each other like a flight of steps. This is a good way to insert the flashing, but not as permanent or as effective as building in the wall. The vertical joints lapping over each other will be apt to belly out some, and that will admit of wind and rain getting in between the flashings, and this defect should be remedied by being filled in with some sort of elastic cement or stopping made of "paint skins" and fine sand. When zinc is used for flashings of this kind, the metal should not be less than No. 13, sixteen ounce zinc. Tin and galvanized iron are both used for flashings, both in valleys and about chimneys and towers, and answers fairly well, but in a first class building it is always better to employ copper, lead or zinc. The question of flashing is a very important one, as the life of a roof often depends much on the efficiency of this work and the quality of the materials employed in the operation.

How to Describe an Arc where the Centre is Inaccessible.

It frequently happens that a segment of a circle has to be described, where the diameter is so great that the centre of the circle of which the segment forms a part, cannot be reached; and if it could, it would be impossible to make use of it in describing the curve required. In order to meet a condition of this sort, the following method, which has been found adequate for the purpose, is submitted: Suppose, for example, A B, Fig 1, to be the span or chord of the segment, and O O the rise.

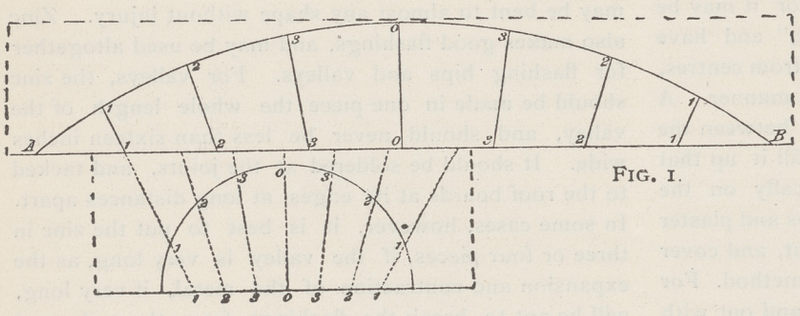


FIG. 1.

FIG. 2.

METHOD OF DESCRIBING A LARGE SEGMENT FOR CENTRES OR SIMILAR WORK.

Prepare a piece of stuff as shown at Fig. 2, and describe on it a semi-circle with the radius O O, of Fig. 1., which is the rise of the arc. Set off from each side of O O, on Fig. 2, any number of equal parts, say four; and in like manner set off four equal parts on each side of O, on the chord or base line of Fig. 2; join the parts on base and circle lines as shown on at 1 1, 2 2, 3 3, on Fig. 2. These lines are extended to the upper edge of board. Now come to the chord A B, and set off on right and left of O, four equal parts, bring upper edge of board Fig. 2 against the chord A B; make line 1, through semi-circle, come opposite point 1, on chord A B, as shown; extend the line by a straight edge and make distance 1, 1, on Fig. 1, equal to the distance 1, 1, on Fig. 2. Now move the board until the line 2, 2, on Fig. 2, is opposite to 2, on the chord line of Fig. 1, then draw line 2, 2, on Fig. 2, in the same direction through the chord, and make 2, 2, in Fig. 1, the same length as 2, 2, in Fig. 2. Slide the board along in like manner to 3 on the chord line and mark line on the same angle as line on 3, 3, Fig. 2; and make the line 3, 3, on Fig. 1, the same length as the line 3, 3, on Fig. 2. O O in both figures will be at right angles with the chord line A B, and the distances will be equal. The points 1, 2, 3, o, etc., will be the points through which the curve of the segment will pass. Nails may be driven in the points found, and used as guides against which a thin strip of wood or metal may be bent in order to get the correct curve. The more divisions there are made in the semi-circle, the more nearly true will be the segment. The method is simple and perfectly reliable for either large or small curves. The principle is based on a very interesting problem in geometry.

ENAMEL-LIKE BLACK COATING FOR METALS.

It has been frequently tried to provide metals, especially steel and iron, with lacquered, bright coatings, but most attempts have been unsuccessful, since the lacquer covering did not possess the necessary elasticity and cracked off, says a Continental exchange. L. Sena now publishes a very simple and inexpensive process to provide metals, especially iron, with such a coating, which will neither peel off nor smell or stick in lacquering, but which can be applied so evenly, since no brush is used, that it may be styled enamel-like.

To produce the coating proceed as follows: Cover the bottom of a cylindrical pot with coal dust; 3 centimeters higher lay in a grate and now fill up the remaining space of the pot with the articles which are to be given the coating. Next close up the pot with a fitting cover and place it on a high fire below a well drawing flue. At first only the moisture contained in the coal evaporates, but soon charring commences, and light brown fumes escape, which excite to coughing. After the bottom of the vessel has been subjected to an incipient red-heat for one-quarter of an hour, whereby the enclosed articles are at the same time exposed to a rather high temperature, the carbonization is finished. The pot is now removed from the fire, and after about ten minutes the lid is taken off to let the fumes eseape from the objects. The latter are now all covered with a bright black coating of high elasticity and great uniformity. The simplicity of the process and the practicability of its application for a large number of cast iron goods promise quite an extensive employment of the method.

CAST IRON PIPE.—Cast iron was known to Holland in the thirteenth century and stoves were cast at Elass in 1400. But tradition has it, which an ancient Roman writer records, that the temple of the "Great Mother," at Sparta, is said to have been built by Theodorus, who first discovered the art of casting and making statues in iron. As with the metal itself, so its discovery in the form of cast iron was an accident which occurred at one of the early works in the Rhine provinces, where a part of the "running" one day was found to be of different texture, and it was a problem for some time what to do with the strange stuff.

VANCOUVER BUILDERS' EXCHANGE.

VANCOUVER, B.C., July 10th, 1899.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

DEAR SIR,—In answer to your enquiry for information concerning the Vancouver Builders' Exchange, I would say that early in the year a number of the builders met at the Hotel Vancouver to discuss the question of organization. We decided that in these days of trusts, unions, and combinations, organization was necessary in order that we might hold our own and keep abreast of the times. In the ARCHITECT AND BUILDER and other trade journals, we noticed that in almost all progressive cities in Eastern Canada and the United States the builders had some kind of an association, and that in promoting their interests, securing privileges and defending their rights, they were succeeding to an extent which, as individuals, would be impossible.

The different classes with whom we as builders do business—the laborers, mechanics, merchants, and in some cases the architects—have these unions and associations, which are equally successful. As contractors, we found that we were hedged in by many protections for other people. First, there are the contract drawings and specifications; next, the superintendence of the architect and clerk of works; then trades' union rules, city by-laws, employers' liability act, etc., etc., with penalties of all sorts to protect everybody from the builder. These things are right and proper to a certain limit, but there is a contractor's side to the business. Often he is obliged to submit to an injustice, because, single handed, he is unable to cope with the difficulties which meet him so frequently.

Taking these facts into consideration, we decided that the necessity for organization was imperative. We appointed a committee to prepare a constitution, rules and by-laws, and notified all the other principal contractors, asking them to join us in organizing an Exchange.

The objects of the association are:

1st. To provide a headquarters where all interested in the building business may meet, transact their business with dispatch and cultivate at all times a feeling of mutual interest and good will. With this end in view, rooms have been taken in the Fairfield block, opposite the post office, in the financial centre of the city, at the junction of the principal car lines and convenient to the architects' offices. We are fitting up our rooms with reading and correspondence tables, telephone and other conveniences so that our members will find our rooms a sort of general bureau of information. From 11.30 a.m. to 12.30 has been fixed as 'change hour.

2nd. To provide for the settlement of disputes of all kinds by arbitration whenever possible, and in other ways to lessen the friction between employer and employee, so that disastrous strikes and lockouts may be avoided.

3rd. To secure the adoption of the "uniform contract" such as is in general use in the United States, in which the conditions are as fair and just for the one as for the other of the parties concerned.

4th. To prevent competition between builders and architects. We have less of this in our city than there is in many others, and we believe that it is to the interest of both and also of the owners that there should be none whatever.

5th. To secure legislation which will render the business of the building contractors less precarious, and to use all legitimate means within our power, as an organization, to further our best interests.

There are rumors afloat to the effect that the Exchange, by resorting to questionable methods, will attempt to limit competition or secure a corner on the building business. We are aware that other Exchanges have made attempts in this direction, but the public may rest assured that the members of our Exchange are too shrewd to adopt any such short-sighted policy.

Our membership fee, as you will observe by the constitution which I enclose, is higher than in many similar organizations. This, and possibly some of our other regulations, may render it difficult for the irresponsible contractor to do business in Vancouver. We consider that we are quite justified in limiting competition to this extent, and that no one will suffer thereby. Any man, however, be he white or black, who can show our membership committee that he is prepared to do a legitimate business, may become a member of the Exchange by paying the same fee as has been paid by the original members. Should he become dissatisfied, or for any reason wish to withdraw, he may do so and receive back his membership fee, less 10 per cent.

The dealers in builders' supplies have recognized us favorably; they, as well as the sub-contractors and tradesmen, are joining as associate members, and are entitled to representation on the Exchange Board.

We have carefully considered the by-laws and rules of similar organizations, and in adopting ours we have tried to avoid the snags upon which others have come to grief. Our Exchange, we hope and expect, will be a permanent institution.

Thanking you for your kind interest and best wishes.

Yours respectfully,

A. E. CARTER,

Secretary Vancouver Builders' Exchange.

MASTER PLUMBERS OF CANADA.

Fourth Annual Convention of the National Association.

On Friday, June 30th, the members of the National Association of Master Plumbers, Gas, Steam and Hot Water Fitters of Canada assembled in convention in the city of Ottawa, the place of meeting being the Victoria Hall. The convention opened at 2:35 p. m., with Mr. Wm. Smith, president of the association, in the chair, and the roll call showed the following members present:

Toronto—Joseph Wright, W. Mansell, W. H. Meredith, James H. Wilson, and A. Fiddes.

Montreal—P. C. Ogilvie, J. W. Harris, John Watson and Joseph Montpetit.

Ottawa—E. B. Butterworth, H. A. Knox, F. G. Johnson, G. Julin, H. Normand, H. Foisy, H. Brown, G. Walsh, John McKinley, Peter Racine, and John Higman.

London—W. Smith and J. W. Chambers.

Halifax—Frank Powers.

A letter was read from the manager of the Starr Iron Company, of Montreal, regretting his inability to be present at the convention, and expressing assurance of a continuance of friendly relations with the master plumbers.

The president appointed Messrs. John Higman, J. W. Harris and J. H. Wilson to act as a Committee on Resolutions, after which the president, Mr. Smith, read the following address:

PRESIDENT'S ADDRESS.

It gives me great pleasure to welcome you to this our annual convention, which, I trust, will prove interesting and beneficial to all. While there has been no marked improvement in the condition of business or trade during the past year, our association has not suffered from the lack of increased membership. Those admitted to membership during the past year coming from all over the Dominion, show that the interest manifested in advancing this, our chosen profession, is not local but universal. No special effort has been made to increase the membership of our association. The majority of the applicants have solicited the honor, which would indicate a recognition of the standing of the association and the necessity for a united action to elevate and advance our profession. Our association has already been the means of accomplishing much good in diffusing a knowledge of the requirements for and the best methods employed in securing good plumbing, heating and ventilation, yet what has been accomplished sinks into significance when compared with the possibilities of an association like ours, with a membership embracing the leading men in the profession in all sections of the Dominion. A united effort on the part of each individual of our association will in time awaken the people and the Government to the fact that good plumbing, heating and ventilation are necessities and not luxuries, and will secure for us the same recognition and legislation that is accorded to other professions. And to accomplish the greatest amount of good to ourselves and to others, it is desirable that we should avail ourselves of every opportunity to advance the interests of this association, and that, in electing officers and appointing committees, we should select those who can best fill the different positions and who are willing to devote a reasonable amount of time to the affairs of the association. We should also endeavor to increase our membership by securing as members all who are eligible for such membership. This can be best accomplished by the individual members in the different sections of the Dominion where they are located.

There can be no more important question before the National body than the purpose it should serve in its relation to its membership. With this question successfully answered the duty of each individual member is plain. When men decide to co-operate, when they agree to harmonize social or commercial interests, the very first thought is what valid excuse have we to offer for such an association? Is the object or purpose praiseworthy? Is it necessary to better social relations or business interests, as the case may be? Is there a principle of right involved which we can use as a basis of organization, and which the great public at large must respect? These are the thoughts which must come to men who found organizations based on social or mutual interests. I believe that the true purpose of an association of master plumbers should be as follows:

1. To advance the cause of scientific sanitation. Why? Because plumbing and house-drainage are its most important department.

2. Its special object should be, therefore, a sanitary law which provides for the examination and registration of plumbing labor, and honest inspection. To secure such a law, public prejudice or ignorance must be overcome. To do this there must be a plan formulated for the education of the people. To educate members, a pleasant association room in each city is essential. The room should be provided with maps

charts, blackboards. The library should consist of the latest scientific journals on house plumbing, drainage and ventilation, and there should be kept on file at all times trade literature for ready reference. To educate the people to realize the necessity of a plumbing law all literature should be issued by the association and distributed by its members to their customers and friends.

3. The chief object of the association should be to place the supply trade and the retail trade on a basis of mutual interest. Their interests are identical, and there should be hearty cooperation. And in my mind there seems no good reason why this cannot be accomplished if right methods prevail.

To this end we must enlarge our membership and improve the commercial credit of our members through open, honorable and cooperative business methods. When we build an association attractive enough to secure 95 per cent. of the purchasing power and reduce the risk of selling materials in our own ranks, we will command absolute trade protection without question, and, what is more desirable, respect. To overcome public suspicion and prejudice, we must by these methods improve the character of plumbing work. There is no surer way to win the respect and confidence of the people than to reduce the death rate of cities and the expense of sickness, which is the result of, I might say, criminal sanitary neglect. An association of plumbers built upon the above broad lines would become speedily a powerful factor in the country's best progress. Following out such a purpose, our annual gathering would become the occasion for scientific discussions and debates of great importance. Here, for instance, we have met in the city of Ottawa, which has, no doubt, been looking forward for months to this convention of master plumbers, believing that the deliberations of this convention will bring to them valuable information, aid and encouragement. What a disappointment it would be should we, as an association, organized to serve the purposes enumerated, fail !

Gentlemen, we make a sad mistake when we, as an association of master plumbers, refuse to interest ourselves in the great sanitary problems of the day. We must be spirited and elevate outselves. I believe the greatest honor that can be bestowed upon a master plumber is to be a delegate to this convention. I believe the plumbing industry is of more importance to the population than all the doctors, for the simple reason that the doctors try to kill the germ after it has been bred, while the plumber abolishes the pest hole that starts the life and gives it a chance to exist. For that reason I think that all master plumbers should protect their interests in every detail.

In conclusion, I trust that you will pardon me for the many suggestions I have made instead of a complete resume of the work accomplished by us during my term of office. In my opinion it is better that the work we have accomplised should be given in detail by the different vice-presidents and members, particularly when it is already pretty well known by all presenr.

The recommendations in the president's address were referred to the Committee on Resolutions for consideration.

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee presented the following report, which was also referred to the Committee on Resolutions:

Your committee have pleasure in submitting thelr annual report to the fourth annual convention, for the year ending June 30, 1899. Two meetings of the executive have been held as a whole during the year, the first taking place on the steamer returning from Quebec, July 1, 1898, and the second being held in the city of Ottawa on June 30 of this year. At the meeting on July 1, 1898, the first business of importance was the appointment of a sub-executive committee, which resulted as follows: William Smith, London; E. R. Russell, London; W. H. Heard, London. The question of issuing a monthly Bulletin and employing a paid secretary was also discussed, but definite action in relation to the same was left over for a future meeting. Subsequently, these matters, with several others, were taken up by the sub-executive, and dealt with as was deemed best in the interests of the association.

The publishing of The Bulletin was entered into by the sub-committee, a separate report of which will be presented by the editor.

Our president has been indefatigable in his efforts to organize branch associations in other towns and cities, the result of which he has already told you in his report. At the same time, we regret that much more work must still be done in this direction, and we feel more and more assured that this cannot be thoroughly accomplished without a permanently-employed organizing agent, and, as in our report of last year, we again urge the great necessity of specially considering this question at the present convention. We have pleasure in reporting that several differences which arose between some of our branch associations and the supply men were carefully gone into by the sub-executive in conference with the officers and members of the Dominion Supply Association, in the presence of the complainants, last April, and were adjusted to the satisfaction of all parties concerned.

List in Accord.—The official Bulletin has contained the full list of manufacturers and dealers who are in accord, and whenever changes were reported to National headquarters they were made and announced in the issue following the notice. During the past year we have taken from the list 11 names, for various reasons.

Official Bulletin.—The editor's report will give full information as to the success of The Bulletin, which was launched on its trial trip in November last.

Re Secretary.—You will remember that, at the Quebec convention, the question of a permanent secretary was discussed, but no definite appointment having been made, Mr. Mansell was asked, and, after great pressure, consented to act again as secretary, but only pro tem., and until such time as the office could be filled permanently. At the first opportunity, your committee looked around for a suitable man to relieve Mr. Mansell. It had been intimated that Mr. W. H. Heard, of London, was willing to act, and he was accordingly chosen, but declined. Mr. E. R. Russell, of London, was also suggested, but he declined. Before reaching this stage of affairs several weeks had elapsed, and Mr. Mansell continued as secretary pro tem., and up to the present time he has done so, while Mr. Beel has performed the duties of the office.

SECRETARY'S REPORT.

The secretary, Mr. W. Mansell, submitted his report for the year, which was as follows:

In making this report I would first of all say that I did not anticipate twelve months ago to again have to make a Secretary's report, as I was only elected to the office pro tem., and fully expected at the time that a secretary would be chosen soon after the Quebec convention. But the year has rolled by without such a change being consummated—two names, however, having been brought by the president before the sub-executive successively, and elected, and each of them ultimately declining to act, for good reasons presumably.

Under these circumstances, though I have nominally held the office, I have not found the same responsibility resting upon me as I otherwise would, and, as I forewarned the convention last year, the clerical part of the work has been done by someone else, viz., Mr. Beel, as it was utterly impossible for me to attend to the duties.

Re Bulletin—This is a new departure in our work; it has been successfully floated, but, like any other new venture, requires all the support and care possible, and I regret that the members of the association have not made as much use of the Bulletin as they might have done. Members, and particularly secretaries of local associations, have in the Bulletin a splendid medium for keeping headquarters better informed from time to time as to the working and progress of the association in their particular vicinity, and I am sure the editor would be only too pleased to hear from any member upon matters of interest to all concerned.

Upon motion of Mr. Meredith, seconded by Mr. Wright, a unanimous vote of thanks was tendered to the secretary for the attention given to the affairs of the association during the year.

REPORT OF APPRENTICE COMMITTEE.

The following report was then submitted by the Apprentice Committee, it being likewise referred to the Committee on Resolutions:

Your committee, having during the past year given the apprentice question earnest consideration, respectfully report that in their opinion apprentices, in the old acceptance of the term, no longer exist in connection with our trade, and that our trade is in this respect no exception from other trades and mechanical callings. As a rule boys are no longer indentured to masters for a term of years, and masters no longer feel any serious obligation in the matter of imparting a knowledge of their calling to the boys who are constantly passing through their shops, staying a longer or shorter period as may suit the convenience of either. The boy remains in the shop if it suits his convenience, and the master keeps him for a similar reason. True it is that in many shops boys remain to become men, but there is no regularity or any recognized rule or law in the trade governing the matter.

The results are deplorable. A class of men are growing up without thorough training in the theory and practice of one of the most important businesses, dealing, as it does, with the most valuable asset of any community (its health). Modern methods have brought about this state of affairs, and without any remedy as yet having been evolved. Years ago the different kinds of goods and fixtures required were made in the plumber's shop. Stocks were piled up during the slack season to be used when the rush came on. To-day the factory, the prison and the asylum do the work, and both man and boy are idle when outside work ceases to be pressing. The master plumbers and other interested in the welfare of the community and in the trade have endeavored to overcome the difficulty through the agency and with the assistance of the trade school. In the Dominion, as far as your committee is aware, there is only one plumbing school. That is in Montreal, and it is in connection with the Council of Arts and Manufactures carried on under the auspices of the Government of the Province of Quebec. This school was begun some years ago, through the efforts of the Montreal Plumbers' Association. Although it has done good work, it is yet far from being efficient, and we regret to say that there is a lack of interest in the matter. Your committee fails to see why the mechanic should not be as anxious to control the class of men who are to follow the trades as are the learned professions. The clergy, the lawyers, the doctors, the engineers, the architects, the druggists, etc., have all definitely defined rules as to the class of men (their studies and their qualifications) who are to enter and practice their professions. Why in this mechanical age the mechanic should be content to follow up a go-as-you-please policy and fail to follow up and take the precaution our forefathers found necessary is more than your committee can understand. An earnest agitation for the founding of mechanical colleges could not fail to be beneficial. It is certainly as necessary from the public health point of view that some care and attention should be given to the education and training of the plumbers as well as the doctor.

Your committee would suggest that, with a view to insuring young men putting in a certain amount of time regularly in the practice of the trade before claiming to be journeymen, that a printed form of discharge be issued by our association, stating

that the bearer, besides having the necessary character qualifications, should be entitled to admission into another shop. Should he be discharged before fulfilling the full time allowed (say five years), his next employer should endorse on his certificate the time he put in with him, and so on until the certificate showed that the holder had worked as a helper or apprentice the number of years that may be decided upon as necessary. It would, of course, be necessary that no master take a lad from another shop unless he was possessed of a properly filled up certificate of discharge.

Further, the plumbing and health by-laws of all cities and towns should contain a clause forbidding the practice of the trade by any journeyman unless he could show a certificate or pass a theoretical and practical examination proving his knowledge of the business.

In conclusion, we would urge upon our association the importance of this subject, and that it should at once put the matter in practical working order. Anything insuring regularity would be a vast gain on the present lax methods.

[Signed] JOSEPH LAMARCHE.
J. W. HUGHES.
JOHN MOLL.
P. J. CARROLL.
JOHN WATSON.

THE OTTAWA ASSOCIATION.

The Ottawa Association, through its secretary, Mr. H. A. Knox, reported as follows:

I am happy to report that the local branch is one of the soundest in the country. We have black sheep, but they are not allowed to hinder us in the least. Our objects are too important to be forsaken because of the inattention of a few. Those whose minds are weakened by individual competition are neither desirable nor worthy men to strengthen the bonds of organization. We have tried to stimulate and strengthen their intellectual power; but, alas! we found them incurable, and our attention is now directed to men who know their opportunities.

We are stronger than last year, by the addition of two members. Consequently we have more representation at the convention.

The evils we have to contend with vary: By-Law No. 1358 of this municipality, for regulating plumbing and inspection, is not enforced, because no inspector exists, uniformity is displaced by confusion, etc., and the results are disastrous all round. The carpenter, the bricklayer and the householder has each his own standard of what is good and what is bad in sanitary and plumbing work. The plumber is not, in many cases, accepted as an authority on his work. The architects, too, are deprived of their just heritage owing to weakness and apathy. What we need badly is the operation of the by-law. Intelligent, skilful and alert workers will then be brought into the ranks. More discrimination ought also to be exercised in selecting boys for the trade.

In our humble opinion, if the reforms we are seeking were sought for by other locals, the association would be a moral, intellectual and financial giant.

H. A. KNOX, Secretary.

On motion of Mr. Harris the report was adopted.

A report by Mr. Beal, regarding the publication of an official bulletin, was submitted. It stated that the first issue appeared in November, 1898, and that the entire expenses of publishing the journal had been covered by receipts from advertisements. After the experience of the past eight months, however, it was evident that in order to continue its publication some financial assistance from the association would be necessary.

REPORT OF THE VICE-PRESIDENT.

Mr. J. W. Harris, of Montreal, vice-president of the Association, submitted the following report:

One year has already gone since I had the honor to be elected vice-president of your association. In submitting this report to your consideration, I will confine myself to a few suggestions which I think will be of general interest, and more especially the following:

I may state, in the first place, that, although the dealings of this association with manufacturers and jobbers during the past year have not been as satisfactory as we would like to see them, I am glad to say that the feeling between us and them is growing better every day.

There are many things to be done yet to better our situation with manufacturers and jobbers, things that I could not mention in this report, but would suggest that a special committee of three be appointed by this association, with full power to confer with a committee of manufacturers and jobbers on any subject that may be of interest to our association, or both associations. That committee should meet at least every three months and make a report of their doings after each meeting to the executive committee.

There is another feeling which I would like to see in existence in our association, that is to have all the members who belong to our society taking an active part in its doings and treating association matters as they would treat their own. Let us look at each other as good neighbors do, and then, instead of losing a year or two in going to Klondyke for gold, we will find good money within a few steps of our door. For that purpose, let us stand to each other and have good members. Then will be the time for us to publish in the papers that we have discovered a gold mine which will benefit the public at large as well as the plumbers.

Report referred to Committee on Resolutions.

REPORT FOR PROVINCE OF NOVA SCOTIA.

A report by Mr. Geo. H. Perrier, vice-president representing Nova Scotia, was then presented, as follows:

As your annual convention is near at hand, and, as you appointed me vice-president for Nova Scotia, I think it will be necessary for me to report upon the work done during the past year in our section of the country.

In the first place, I might say that our local association, which takes in Prince Edward Island, is in very good form. The majority of the members take an active interest in the good work, which, as you know, is half the battle. We have about twenty-six members in good standing, which I think is very good for Halifax and vicinity.

There is another matter I would like to say a word about, and that is that we do not receive encouragement from headquarters. An occasional letter from the heads of our Dominion Association would let us know that we are not simply local, but that we are a part of the Dominion Association and backed by men that are ready to stand by us in any reasonable cause.

I see by the report of our last meeting, held in Quebec, that the committee appointed to consider the question of appointing a permanent secretary reported in favor of engaging one, which I think would be a move in the right direction, for I consider the work in connection with association matters takes up so much of our secretary's time that he should be paid for it.

In conclusion, gentlemen, I must express my regret in not being able to attend the convention, but wish it every success.

GEORGE H. PERRIER.

The president, referring to the statement by Mr. Perrier that the eastern associations did not receive encouragement from headquarters, replied that he had written a number of letters, but to many of them no replies had been received. After some further discussion the report was received and referred to the Committee on Resolutions. Messrs. Joseph Wright, J. W. Chambers and E. B. Butterworth were appointed auditors, after which Mr. John Higman, vice-president for Ontario, presented the following report:

As vice-president for Ontario, I beg respectfully to submit my report for the year ending June 30, 1899. During my term of office, I have written several master plumbers in the cities and towns of the eastern part of the province, doing my best to induce them to join the nearest local association, with great hopes, in many cases, of their doing so, or of forming local associations where three or four master plumbers are established. But it is a great surprise to me that so many bright and intelligent master plumbers still hold back from joining the association, when it is so evident that, if we wish to attain the high position we are entitled to, every master plumber should join the association.

The members of the Ottawa association are doing their best to help the good cause along. This year we tried to get the city council to pass a plumbing by-law, with the hope of having a plumbing inspector appointed, but did not succeed at the time, but hope to in the near future. In fact, a plumbing inspector is badly needed in Ottawa, in the interest of the public health and for raising the standard of the plumbing trade generally.

We have had two cases of wholesale firms selling to consumers here in Ottawa, which were referred to the executive to deal with, which had the desired effect.

In conclusion, I take great pleasure in thanking the officers and members of the Master Plumbers' Association for their uniform kindness during my term of office. (Signed) John Hyman.

The secretary then read the following resolution of condolence, which, on motion of Messrs. Wright and Powers, was concurred in:

Whereas,—It having been reported to this convention that, since our last annual gathering, two of our most active members, viz., W. H. Briggs and J. Horton, both of Montreal, have passed away from the scene of their labors, therefore, be it

Resolved,—That, in the death of those comrades and friends, we have lost two of our truest and hardest-working members. How much they contributed to the prosperity of the association will probably never be known, but the kindly and devoted interest they took in all matters connected with the trade will not soon be forgotten by their wide circle of friends.

Resolved,—That the delegates of this convention sympathize with the families and friends of our late confreres in their bereavement, believing that "He that doeth all things well" will console them in their time of distress.

Resolved,—That these resolutions be inscribed in the proceedings of this convention, and that a copy thereof be forwarded by the secretary of the association to the families of the deceased.

Mr. Wright read a letter from Mr. W. J. Barr, of the Vancouver Association, requesting him to represent that association at the convention, and stating that the association was progressing steadily. A brief report was also read from Windsor association.

In reply to a question from Mr. Butterworth as to why Ottawa was not represented on last year's execu-

tive, Mr. Wright explained that in selecting the executive committee last year the idea was to have members who were near each other, in order to curtail the travelling expenses.

REPORT OF COMMITTEE ON RESOLUTIONS.

Mr. Harris presented the following report of the Committee on Resolutions :

Your Committee on Resolutions beg leave to report as follows :

1. The executive committee, in our opinion, has done its best during the past year to bring business to a good result, and we would urge the members to continue their good assistance to them.

2. Regarding the president's report, we recommend the members to follow as much as possible the very wise advice given in that very elaborate and intelligent document, for which we recommend a hearty vote of thanks.

3. In regard to the report of the vice-president, we recommend, as suggested in his report, that a committee of three be appointed, two from Montreal and one from Toronto, with full power to meet with a committee of manufacturers and jobbers to treat on any subject that may be of interest to both associations.

4. In connection with the secretary's report, we beg to concur in the hearty vote of thanks to him, and recommend the adoption of his report.

5. In regard to the report of the committee on apprenticeship, we beg to state that we fully agree with all its contents, and would recommend its adoption at this convention.

6. Re. Bulletin report, we beg to confirm the motion which was passed at the executive meeting this morning, which left it in the hands of the executive for further consideration.

7. We recommend the adoption of the report of the vice-president for the province of Ontario.

8. By the report of George H. Perrin, for the Provinces of Nova Scotia and Prince Edward Island, we are pleased to see that they have succeeded in getting the jobbers to sell to members of their association only ; we would recommend that all places which are in a similar position use their best endeavors to obtain the same. We recommend its adoption.

9. Regarding the secretary's report of the city of Ottawa association, we beg to confirm its adoption.

10. Re. the correspondence from the Starr Iron Co. to the Ottawa association in regard to the manufacturers forbidding its members to attend our convention, we strongly condemn their action, as their reasons for taking this action refer to the conduct of a few members, and it is unjust to treat this association as a body as they have done, particularly as a majority of the members of this National Association are quite ignorant of the facts in regard thereto.

J. W. HARRIS.
JOHN HIGMAN.
J. H. WILSON.

It was decided to take up the report seriatim, and, on motion of Messrs. Wright and Montpetit, the President's address and the report of Executive Committee were adopted.

The clause referring to the report of Vice-President Harris created a lengthy discussion. Mr. Harris explained that the object of the proposed committee was that they should be ready at all times to confer with representatives from the Dominion Association. Mr. Mansell could not see any difference between the committee proposed to be appointed and the sub-committee now existing for the purpose. The feeling seemed to be that the appointment of this special committee was unnecessary, and after this clause had been struck out, this portion of the report was adopted.

The Secretary's report was adopted without discussion.

The consideration of the report of the Apprentice Committee resulted in a discussion as to the competency of workmen. Mr. Harris stated that sometimes men asked for employment, claiming to have served ten years, when perhaps they had served only a few months, and it was only after they had destroyed material that their incompetency was discovered. Mr. Watson suggested that an apprenticeship agreement should be drawn up by the National Association. The report was adopted, as also were the reports in regard to the Bulletin and by the Vice-President for Ontario.

Some discussion arose as to the action of the Plumbers' Supply Association in resolving not to attend the convention of Master Plumbers, it being considered by some to be an insult to the members of the Association.

Mr. Meredith moved that clause 2 of article 3 of the Constitution be amended by inserting the following words : "Each said delegate to be known and designated vice-president of the province he represents." This makes the clause read as follows : "Its officers shall consist of a president, vice-president, financial and recording secretary, treasurer and executive committee. The executive shall consist of the president, vice-president, financial and recording secretary, treasurer, retiring president, and a delegate from each province represented in the Association, who shall be elected at the annual meeting, each said delegate to be known and designated vice-president of the province he represents. The president shall be chairman of the Executive Committee." The motion was carried.

The President outlined a scheme of reorganization with which he was in favor. He recommended that the plumbers in the different provinces of the Dominion should organize as separate associations, each provincial association having its convention, and at this convention electing a member to represent it in the Dominion Association. He pointed out that with the Executive Committee residing, say, in Toronto, it was difficult to adjust grievances in the Maritime provinces and in Manitoba and British Columbia. If the members were in favor of the proposition, he asked that a committee be appointed, preferably to consist of one member from each local association.

Mr. Ogilvie could not see any advantage in such a step, while Messrs. Mansell and Harris spoke in favor of the scheme. The latter pointed out that a thing which worked well in one province might not work well in another. He moved the appointment of a committee, consisting of Messrs. Smith, Mansell, Ogilvie and the mover, to consider the matter and report to the convention on the following morning. This was seconded and carried, after which the convention adjourned to meet at 8.30 a.m. on Saturday morning.

SECOND DAY.

Upon re-assembling on Saturday, the president appointed the following Nominaring Committee : Mr. Wilson, Toronto ; Mr. Watson, Montreal ; Mr. Knox, Ottawa.

It was announced that representatives from some of the supply houses were, according to agreement, waiting in the ante room. The sergeant-at-arms then admitted the following gentlemen : Mr. J. Carlind, of the Ideal Manufacturing Co., Detroit ; Mr. T. M. Stewart, of McAvity & Co., St. John, N B.; Mr. McDougall, of James Smart Manufacturing Co., Brockville ; Mr. Arthur Betton, of the James Morrison Brass Manufacturing Co., Toronto ; Mr. Forbes, of W. Stairs, Son & Morrow, Halifax, and Mr. A. Saunders, of the Goderich Organ Co. Each of the above gentlemen made a few brief remarks, referring to the necessity of good feeling existing between the supply men and the plumbers, after which a vote of thanks was tendered to the gentlemen.

ELECTION OF OFFICERS.

The Nominating Committee presented their report, nominating for president Messrs. W. Smith and J. W. Harris. Mr. Smith voluntarily retiring, Mr. Harris was declared elected as president of the association. For vice-president, Mr. Wilson nominated Mr. W. Mansell, which nomination was approved by the convention. Mr. P. C. Ogilvie, of Montreal, was nominated for secretary and elected without opposition, while Mr. W. H. Meredith, of Toronto, was re-elected treasurer.

The Nominating Committee submitted the following names as provincial representatives on the Executive : Ontario, H. A. Knox, Ottawa ; Manitoba, J. H. Wilson, Toronto; Quebec, John Watson, Montreal; British Columbia, Joseph Wright, Toronto. Mr. Powers, of Halifax, asked if the Maritime provinces should not be represented, whereupon Mr. Frank Powers was chosen to represent New Brunswick. On motion of Mr. Harris, seconded by Mr. Knox, the provincial representatives on the Executive Committee were declared elected vice-presidents for their respective provinces.

The treasurer, Mr. Meredith, presented his annual report, which showed receipts of $1,499.64 and expenditure of $1,329.20, leaving a balance of $170.44. He pointed out that the sum of $96.75 on account of the Bulletin was still due, also that $8 had been received from Winnipeg Association, making the total surplus $275.19. The report was adopted.

The special committee appointed on the previous day to report on the President's provincial association scheme, submitted their report, recommending that a committee be appointed to consider the formation of provincial associations, the said committee to report to the Executive Committee. The report was concurred in, and Messrs. W. Smith, J. W. Chambers, and E. R. Russell named as a committee to act in this connection.

Messrs. J. Wright, W. Mansell and W. H. Meredith were appointed a committee to report at the next convention upon

the question of continuing the publication of the official bulletin.

It was unanimously decided that the next convention should be held in the city of Montreal, although Toronto and Halifax were also brought up for the consideration of the convention.

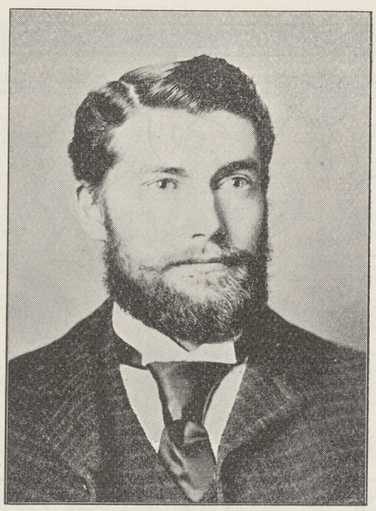
The report of the auditors, then presented, certified to the correctness of the treasurer's books. The new officers were then escorted to their respective positions, and the convention adjourned at 12.05 p.m.

THE BANQUET.

On the evening of June 30th a banquet was tendered the visiting delegates by the local association at the Grand Union Hotel. Mr. John Higman, president of the Ottawa Association, presided in a fitting manner. About forty guests sat at the tables and a most enjoyable evening was spent. Letters of regret were read from City Engineer Gilt, Assistant City Engineer Kerr, Medical Health Officer Robillard, Chief of Police Powell, Warden King & Son, Dominion Radiator Co., Toronto, H. MacLaren & Co., Montreal, H. R. Ives & Co., Montreal. The menu was elaborate and the after supper speeches brief and humorous. The various toasts were responded to as follows: "Her Majesty the Queen" by the singing of the National Anthem; "Our Guests, The National Plumbers and Visitors," by Messrs. Wm. Smith, J. W. Harris and W. H. Meredith; "The Mayor and Corporation," by Mayor Payment, Ald. Davis and ex-Ald. Hill, chairman of Board of Health; "The Supply Men of Canada," by Messrs. A. Saunders, of Goderich Organ Co., T. M. Stewart, of T. McAvity & Co., Wm. Grey, of James Robertson Co., and A. Betton, of James Morrison Mfg. Co.; "The Local Master Plumbers," by John Higman and E. B. Butterworth. Songs were contributed by Messrs. Wilson, Knox, Saunders, Stewart and Dundale, and a string band enlivened the proceedings.

MR. J. W. HARRIS.

Mr. J. W. Harris, president-elect of the National Association of Master Plumbers of Canada, is a member of the plumbing firm of Lessard & Harris, Craig street, Montreal. He was born in Buffalo, N.Y., in 1865, removed to Montreal when seven years old, thence to Chicago, where he



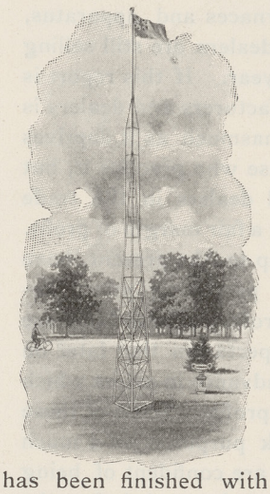
MR. J. W. HARRIS.

learned the plumbing and heating business. Returning to Montreal a few years later he became manager for Brodeur & Lessard. At the end of five years Brodeur retired, and Mr. Harris became a partner. He has invented and patented several useful devices, and a special system of ventilation for buildings, and is also a mechanical engineer.

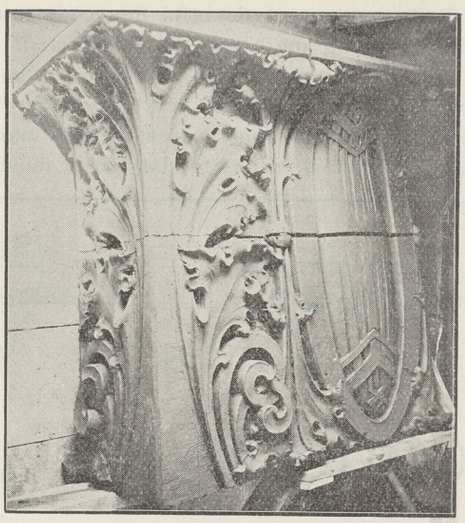
What is said to be the largest sheet of glass ever blown was recently turned out at the Chambers Glass Factory, New Kensington, Pa. It measured 54 x 84 inches.

STEEL FLAG STAFFS.

The accompanying illustration represents a galvanized steel flag staff recently erected on the grounds of the Normal School at Ottawa. These staffs are made of steel angles and pipe, thoroughly galvanized. They are made for use on the tops of buildings as well as on lawns. Messrs. Goold, Shapley & Muir Co., of Brantford, Ont., are the manufacturers.



The walls of a Washington dining room are paneled their entire height with mahogany, the panels being small and square, perfectly flat, with a simple moulding surrounding them. The wood has been washed with weak lime water to darken its tone, and then has been finished with a dull gloss. The room is lighted from a skylight, which is centered over the table, and is filled with a fantastic tracery in opalescent glass, whose radiance is cast upon the white cloth and the glittering glass and china, lighting it up with gorgeous coloring. In the vertical space under the skylight is a series of panels, filled with a frieze of classic figures in low relief, tinted to give the effect of old ivory. The ceiling round the skylight is paneled like the side walls.



Clay Model of Portion of Terra Cotta Cornice, Brown Bros.' Warehouse. By W. J. HYNES, Gould Street, Toronto. BEAUMONT JARVIS, Architect.

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CONDITIONS IN THE HEATING TRADE.

The complaint is heard that, notwithstanding the considerable increase in prices of material entering into the construction of heating furnaces and apparatus, some of the manufacturers and dealers are still selling at about the same prices as last year. If this report is correct the policy of these manufacturers and dealers is certainly one to be condemned, inasmuch as it deprives of legitimate profits not only those who practice it, but also the other manufacturers and dealers in the trade who may be desirous of selling at a fair margin of profit. We know of some firms who, up to the present, have refrained from pushing sales at prevailing prices, because they admit of little or no profit. These firms are increasing their stock in the expectation that later on in the season there will come an advance in prices which will allow sales to be made at a profit. Some of these firms are manufacturing for stock purposes on a much larger scale than last year, and are confident of being able to dispose of the whole of their stock before the close of the year. A considerable business in heating apparatus is being done in the North West and British Columbia. Notwithstanding the mildness of the climate in the latter province many hot water plants are being sold and installed.

At least some of the manufacturers of heating apparatus learned well the lesson during the boom days in Toronto that it is unprofitable and altogether unwise to sell goods to persons of doubtful financial standing, and credits are being more and more restricted. This is a line of business policy which all who have the commercial welfare of the country at heart must approve of. The system under which American wholesale manufacturing companies limit credits to sixty days, must have the effect of shortening credits in this country also, as manufacturing firms who must pay for their goods within sixty days, cannot afford to sell to their customers at four months.

This restriction of credit, as well as other business regulations imposed by American manufacturers, must operate to the advantage of firms in this country doing business on a large scale, with ample capital, and conversely, to the disadvantage of the smaller class of traders. The extraordinary volume of trade which is now flowing into American manufacturers tends to make them unusually independent in their terms to customers. The formation of manufacturing trusts which control the market in different lines, has operated in the same direction. As an instance, the manufacturers of steel sheets have intimated recently that in future they will not pay freight charges except on orders of 30,000 pounds and upwards. The disadvantage to which the smaller firms will be subjected by this regulation is self-evident.

Speaking of this phase of the subject, it is learned that large profits have been made by wholesale jobbers who were able to pay spot cash for their goods, and who, foreseeing that prices of materials were almost certain to increase to a considerable degree, placed large orders for such goods with the mills, and are now reaping rich profits as a result of their ability to gauge future conditions, and also their financial ability to take advantage of the situation.

The High School Board of Toronto have appointed a committee to report to the board on the desirability of adding a course of manual training to the courses now provided in the Collegiate Institutes.

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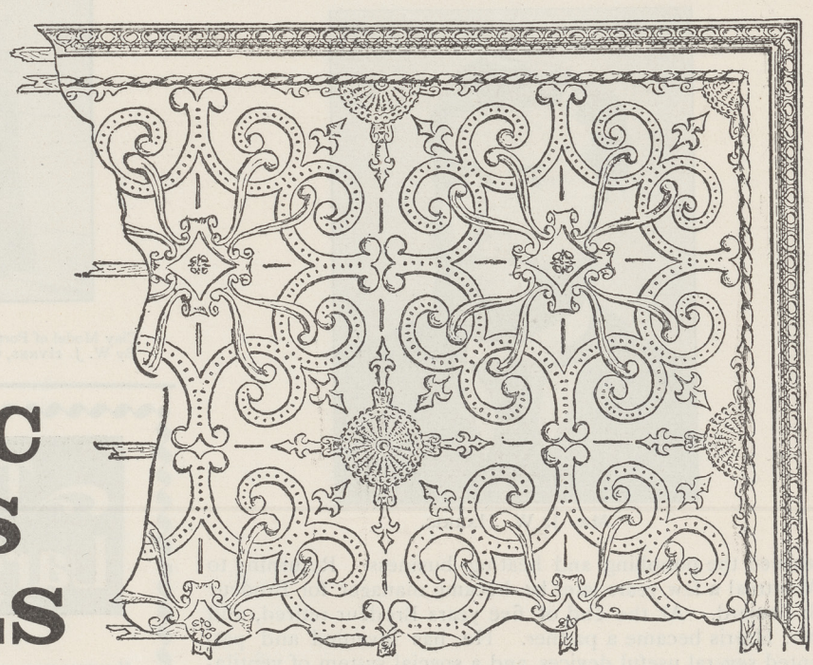

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